

THE SYSTEMATICS OF NEOTROPICAL ORB-WEAVING SPIDERS IN THE GENUS *METEPEIRA* (ARANEAE: ARANEIDAE)

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ABSTRACT. Of the 39 species and three subspecies of the orb-weaver genus *Metepeira* in the Americas, 36 species and two subspecies are known to occur outside of the U.S. and Canada. Yet, despite their conspicuous webs, diurnal foraging, and relatively common presence, the taxonomy of *Metepeira* is poorly understood, probably because the genitalia are small and difficult to distinguish. In fact, many names for species south of the U.S. were, at some time, incorrectly synonymized with the name *Metepeira labyrinthea*. In this paper, 14 new species are named (*Metepeira atascadero*, *M. cajabamba*, *M. calamuchita*, *M. celestun*, *M. inca*, *M. lacandon*, *M. maya*, *M. olmec*, *M. pacifica*, *M. petatlan*, *M. piumungan*, *M. revillagigedo*, *M. roraima*, *M. tarapaca*); 11 new junior

synonyms are reported (*M. acostai*, *M. bani*, *M. dominicana*, *M. grinnelli*, *M. latigyna*, *M. perezi*, *M. santa*, *M. salei*, *M. seditiosa*, *M. vaurieorum*, *M. virginensis*); five cases of erroneously synonymized names are reversed; 22 species and two subspecies are re-described (*M. arizonica*, *M. triangularis*, *M. chilapae*, *M. comanche*, *M. compsa*, *M. crassipes*, *M. datona*, *M. desenderi*, *M. galatheae*, *M. glomerabilis*, *M. gosoga*, *M. grandiosa alpina*, *M. grandiosa grandiosa*, *M. gressa*, *M. incrassata*, *M. jamaicensis*, *M. karkii*, *M. minima*, *M. nigriventris*, *M. rectangula*, *M. spinipes*, *M. uncata*, *M. ventura*, *M. vigilax*); and a key to all *Metepeira* species is presented. In addition, several ecological and life history observations are reported for various species.

INTRODUCTION

The absence of a comprehensive revision of Neotropical *Metepeira* has left the taxonomy of this group in shambles. Over the years, a fair number of species have been named, particularly by A. F. Archer, R. V. Chamberlin, and W. Ivie. However, these efforts have been sporadic and, for the most part, scant. For example, the description of *Metepeira dominicana* (Archer, 1965) provides little information other than "form typical of *Metepeira* in all respects," a few measurements, and two unrecognizable figures. Even when species are properly described they have far less taxonomic value when published alone, in the absence of a full comparative revision.

The poor understanding of *Metepeira* taxonomy has persisted despite great ecological and behavioral interest in this genus. Indeed, many species are obligate or facultative social species and offer excellent models for investigating genetic and environmental factors that influence colony formation (e.g., Uetz and Cangialosi, 1986; Uetz et al., 1987). The monumental work carried out over many years by G. W. Uetz has made great strides in our understanding of gregarious social behavior in spiders and in risk-sensitive foraging theory in general (e.g., Uetz, 1996). Still, in the absence of solid taxonomic literature, behavioral ecologists have been forced to apply informal names to their study animals (e.g., *Metepeira* "atascadero" in Uetz [1989] or *Metepeira* "Species A" in Viera

[1989]), but this practice can lead to trouble. In one case, the behavior of several different species was initially studied under the false assumption that they all belonged to the same species (e.g., Uetz et al., 1982). Clearly, a strong taxonomic foundation is important for further biological work.

Ultimately, the relatively small, indistinct genitalia and the relatively homogeneous abdominal patterns are to blame for the weakness in our knowledge of *Metepeira* taxonomy. Many of these species are undoubtedly hard to distinguish, and this fact has surely intimidated arachnologists from taking on the painful task of revising the group. In the absence of good distinguishing characteristics, the catalogs of Bonnet (1957) and Roewer (1942) synonymized the names of many Neotropical species with the name *Metepeira labyrinthea*. Levi's (1977) revision of Nearctic species observes that *M. labyrinthea* is actually limited to the eastern United States. One task in this revision consists of reasserting the names of species that were improperly synonymized and clarifying the diagnostic characters that are needed to identify them.

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MATERIALS AND METHODS

Collections Examined. The taxonomic revision was carried out on specimens borrowed from the following collections. The abbreviations correspond to those listed with each record after every species description. I am grateful to the museums, curators, and staff that graciously loaned the material.

ADC	A. Dean, Texas A&M University, College Station, Texas, United States
AMNH	American Museum of Natural History, New York, United States; N. Platnick, L. Sorkin
BMNH	Natural History Museum, London, England; P. Hillyard
CAS	California Academy of Sciences, San Francisco, California, United States; C. Griswold
CV	Carlos Valderrama A.; Bogotá, Colombia
FSCA	Florida State Collection of Arthropods, Gainesville, Florida, United States; G. B. Edwards
IRSNB	Institut Royal des Sciences Na-

JAK	turelles de Belgique, Brussels, Belgium; L. Baert J. A. Kochalka, Ciudad Universitaria, Paraguay
JEC	J. Carico, Lynchburg, Virginia, United States
JMM	J. Maes, León, Nicaragua
MACN	Museo Argentino de Ciencias Naturales, Buenos Aires, Argentina; E. A. Maury, C. L. Scioscia
MCN	Museu de Ciências Naturais, Fundação Zoobotânica do Rio Grande do Sul, Porto Alegre, Rio Grande do Sul, Brazil; E. H. Buckup, M. A. L. Marques
MCZ	Museum of Comparative Zoology, Harvard University, Cambridge, Massachusetts, United States; H. W. Levi
MECN	Museo Ecuatoriano de Ciencias Naturales, Quito, Ecuador; Germana Estévez Jácome
MEG	M. E. Galiano, Buenos Aires, Argentina
MLJC	Maria Luisa Jiménez, Centro de Investigaciones Biológicas del Noroeste, La Paz, Mexico
MLP	Museo de Universidad Nacional, La Plata, Argentina; R. F. Arrozpide, C. Sutton
MNRJ	Museu Nacional, Rio de Janeiro, Brazil; A. Timotheo da Costa
MNSD	Museo Nacional de Historia Natural, Santo Domingo, República Dominicana; Félix Del Monte
MUSM	Museo de Historia Natural, Universidad Nacional Mayor de San Marcos, Lima, Peru; D. Silva
MZSP	Museu de Zoologia, Universidade de São Paulo, São Paulo, SP, Brazil; P. Vanzolini, J. L. Leme
MZUF	Museo Zoologico de “La Specola” Università di Firenze, Florence, Italy; S. Whitman
NRMS	Naturhistoriska Riksmuseet, Stockholm, Sweden; T. Krones-tedt
PAN	Polska Akademia Nauk, Warsza-

	wa, Poland; J. Prószyński, A. Słowajewska, W. B. Jedryczkowski
REL	R. E. Leech, Edmonton, Alberta, Canada
SMF	Forschungsinstitut Senckenberg, Frankfurt am Main, Germany; M. Grasshoff
SR	Susan Riechert, Knoxville, Tennessee, United States
USNM	National Museum of Natural History, Smithsonian Institution, Washington, D.C., United States; J. Coddington, S. F. Larcher
ZMB	Zoologisches Museum der Humboldt Universität, Berlin, Germany; M. Moritz
ZMUC	Zoologisk Museum, Copenhagen, Denmark; H. Enghoff, N. Scharff
ZSM	Zoologische Staatssammlung, Munich, Germany

Locality Data Storage and Manipulation. Locality data from each collection vial were entered into a database designed using Claris FileMaker Pro[®]. Geographic coordinates were added to locality data that lacked them using maps, USBGN gazetteers, and on-line databases (<http://164.214.2.59/gns/html/> and <http://mapping.usgs.gov/www/gnis/>). Occasionally locality information was illegible or unknown or one of several homonymous sites. In such cases a reasonable, educated guess was made and a “[?]” designation was appended to the locality. In some cases the itinerary of a collector was reconstructed from other known records, and the ambiguous locality was assigned a coordinate halfway between the previous and following known collection sites. The locality database worked in concert with the mapping program Atlas Pro[®] to generate thematic maps on the fly. These maps helped in the process of delimiting species and discovering cryptic species.

Elevation (in meters) was estimated for each locality that lacked this information. In some cases, elevation was estimated us-

ing contour maps, such as DMAAC ONC aeronautical maps; in most cases, elevation was estimated using NOAA data with an on-line database server (<http://phylogeny.harvard.edu/~piel/find.html>).

The enhanced locality database was used to reveal ecological and life history traits. Seasonality of species was expressed by plotting a circular histogram showing the relative amount of collecting activity per 5-day interval (Figs. 300–337). While locality dates alone cannot control for the seasonal activity of human collectors, these data at least provide an estimate of spider seasonal abundance, if only approximate. Some sympatric species show incongruous seasonal abundance, which is at least some evidence that seasonality of spider collectors does not unduly overshadow the seasonality of the spiders themselves.

Examination and Illustration. Specimens were examined under 80% ethanol in a dish with light and dark sand grains for specimen support. Digital photographs of preserved specimens were taken through a Nikon SMZ-10 photomicroscope using a Panasonic WV-CL320 CCD video camera, chosen for its high sensitivity to light. Video images were captured using a QuickImage[®]24 digitizer and edited on a Quadra 700 Macintosh[™] computer. The computer allows relatively inexpensive pictures to be printed rapidly on a 1,200 dpi Xanté[™] Accel-a-Writer 8200 laser printer. Digital pictures were used to help sort out individuals to species, to create publishable pictures of gross dorsal and ventral markings, and to aid in the illustration of genitalia. As an aid in illustration, the digital pictures functioned as a camera lucida because they assured accuracy when drawing the proportions of genital parts and sclerites. Usually a digital picture was laid over carbon paper and an outline of the genitalia was transferred to coquille board underneath. The illustration continued on the coquille board using a Staedtler OmniChrom[™] pencil and a drafting pen with India ink and then was scanned at 600 dpi on a LaCie Silverscan-

ner II[®]. The resulting digital image was edited in Adobe Photoshop[™] and reduced in size to 1,200 dpi. The edited figures were finally arranged on plates using Canvas[™].

External genital structures were manipulated with pins to reveal hidden parts. The terminal division on the male palp is hinged, so it had to be pried open to see the embolus and embolic apophyses properly. In females, mating plugs had to be removed from epigynal openings using pins. Sometimes the entire epigynum was partly cut from the body so as to see it from a posterior view.

Internal genital structures were studied by clearing them in clove oil and examining them using an Olympus BH-2 compound microscope. Sketches were made directly on the computer in Canvas[™] by aiming the camera lucida at the computer monitor. While internal genital structures helped in the process of delimiting species, they did not prove to be as useful as external genital structures in describing species; thus, these working sketches are not figured herein.

Measurements of the spiders were taken using a Leitz stereo dissecting microscope with a calibrated reticule. Sizes of leg articles, eyes, and carapace, were performed on one specimen of each sex, for each species. The respective localities of the candidate specimens were indicated in the descriptions. This study placed little reliance on spider leg measurements because they are not usually very useful in spider taxonomy, and because *Metepeira* species are notorious for their variability in size (Levi, 1977; Piel, 1996).

All eye sizes were reported as a ratio of the posterior median eye diameters to the diameter of every other eye type. For example, in the case of "ratio of eye diameters: posterior medians and anterior medians 2.0, anterior laterals 0.5, posterior laterals 1.0," the reader should interpret the anterior medians to be half the size of the posterior medians, and the anterior laterals to be twice the size of the posterior

medians. Eye separations were expressed in terms of their own diameters, or in terms of the anterior lateral eyes when between eyes of different types. Oval eyes were measured as an average of the longest and shortest lengths.

In parallel with the last revision of *Metepeira* (Levi, 1977), leg measurements were made on each article distal to the trochanter for the first leg and on the combined lengths of the patellae and tibiae for all remaining legs. Variation in total body size was provided as an average, minimum, and maximum of the total lengths from a number of mature specimens, usually chosen from a wide geographic spread.

Metepeira F. O. P.-Cambridge

Metepeira F. O. P.-Cambridge, 1903: 457. Type species by original designation *M. spinipes* F. O. P.-Cambridge 1903. The name is feminine.

Diagnostic Abstract. Web combines barrier or scaffolding structure surrounding a classic araneid orb with a retreat suspended in air (Fig. 1). Like a raccoon with its facial colors reversed, the eye region is lighter than any other part of the carapace (Fig. 2). The venter has a wide median white line set on a black background that, with only some exception, extends anteriorly on the sternum (Fig. 3). With one exception, the total lengths of distal leg articles (metatarsus and tarsus) exceed that of the middle articles (patella and tibia). The median apophysis has two distinctive flagella (F in Fig. 5) and, in some species, an easily recognizable keel (K in Fig. 5). The dorsal abdominal markings (the folium) look like an inverted fleur-de-lis, allowing easy recognition of the genus in the field (Fig. 2).

Description and Diagnosis. For field ecologists, the most obvious and distinctive feature of *Metepeira* is the combination of orb and barrier web (Fig. 1). The barrier web forms scaffolding around an almost vertical orb and supports the spider's retreat, which is thus suspended away from any substrate.

In contrast to most araneids, the cara-

pace of *Metepeira* is lightest in the eye region. However, this distinctive feature varies within the genus: in the case of *M. rectangula* (Nicolet, 1849), the lighter region takes up almost half the carapace (Fig. 65); in the case of *Metepeira* F. O. P.-Cambridge, 1903, the lighter region is usually limited to the anterior edges of the carapace (Fig. 2). White, downy hairs often cover the carapace but are especially white and conspicuous on the lighter parts of the carapace outside the eye region. In some species, such as *M. spinipes*, these hairs make the carapace look gray or silvery when the spider is alive, but dark brown when the spider is in ethanol.

The eyes of *Metepeira* are not particularly unusual. Eye separations relative to eye diameters increase with spider size: larger spiders tend to have relatively greater eye separations. In either sex, the posterior median eyes are between 1.1 and 1.7 times the size of the anterior medians, and the separation between posterior median eyes is between 0.4 and 0.7 of that between anterior median eyes. The separation between the anterior median eyes and the anterior lateral eyes is between 1 and 3.7 times the size of anterior median eyes in males and between one and five times the size in females. The diameter of the anterior median eyes exceeds the height of the clypeus.

The shape of the female abdomen ranges from wider than long and rhomboid (*M. datona*, Fig. 12) to roundish (e.g., *M. desenderi*, Fig. 20; *M. rectangula*, Fig. 65), to longer than wide and oval (e.g., *M. inca*, Fig. 169). The dorsal folium has a recognizable white fleur-de-lis pattern, usually on a dark background, its edges shaped by a wavy, zig-zag white outline (Fig. 2). The dorsum of live spiders is often more reddish—a pigment that rapidly dissolves in alcohol.

Somewhat less common among other araneids is the median white line on the venter of the abdomen (Fig. 3), which is present (though shortened) even in the most darkly pigmented species. However,

unique among araneid genera is the combination of median white line on the venter and median white line on a black or brown sternum. Some *Metepeira* species lack a complete white line on the sternum, but even those, such as *M. datona*, that usually have an entirely black sternum nonetheless show hints of white markings in some specimens. Characteristics found in the carapace, abdomen, and sternum of *Metepeira* are also found in *Araneus koepckeorum* Levi, but this last species lacks the white line on the venter.

With the exception of *M. datona*, and in some cases, *M. desenderi*, all *Metepeira* species have a combined metatarsus and tarsus that is longer than the combined patella and tibia. This feature is unusual among araneids and is not found in *Kaira* O. P.-Cambridge or other likely relatives to *Metepeira* (Levi, 1977; Piel and Nutt, 1997).

In most species the leg articles are ringed, usually with brownish black on the distal and dorsal surfaces of each article, except for the patellae and tarsi which are usually entirely dark. In mainly tropical and high-altitude species, the coxae are mostly black (e.g., Fig. 75), but in desert/mesquite species they appear yellowish white (e.g., Fig. 28).

Unlike many other araneids—and perhaps because of the small male size—the coxa on leg I of male *Metepeira* lacks the hook and corresponding groove typically found on femur II. In addition, males lack a tooth on the lateral side of the endite, and they lack a basal tooth on the palpal femur. The phylogenetic analysis of Scharff and Coddington (1997) incorrectly codes *Metepeira* as having a tooth on the endite. However, had the authors coded this character as absent, they would have decreased the length of their preferred tree because the nearest relatives hypothesized for *Metepeira* (*Kaira*, *Zygiella*, and *Singa*) also lack this tooth.

Macrosetae usually concentrate on articles that contact other spiders during mating or grappling. In contrast to most gen-

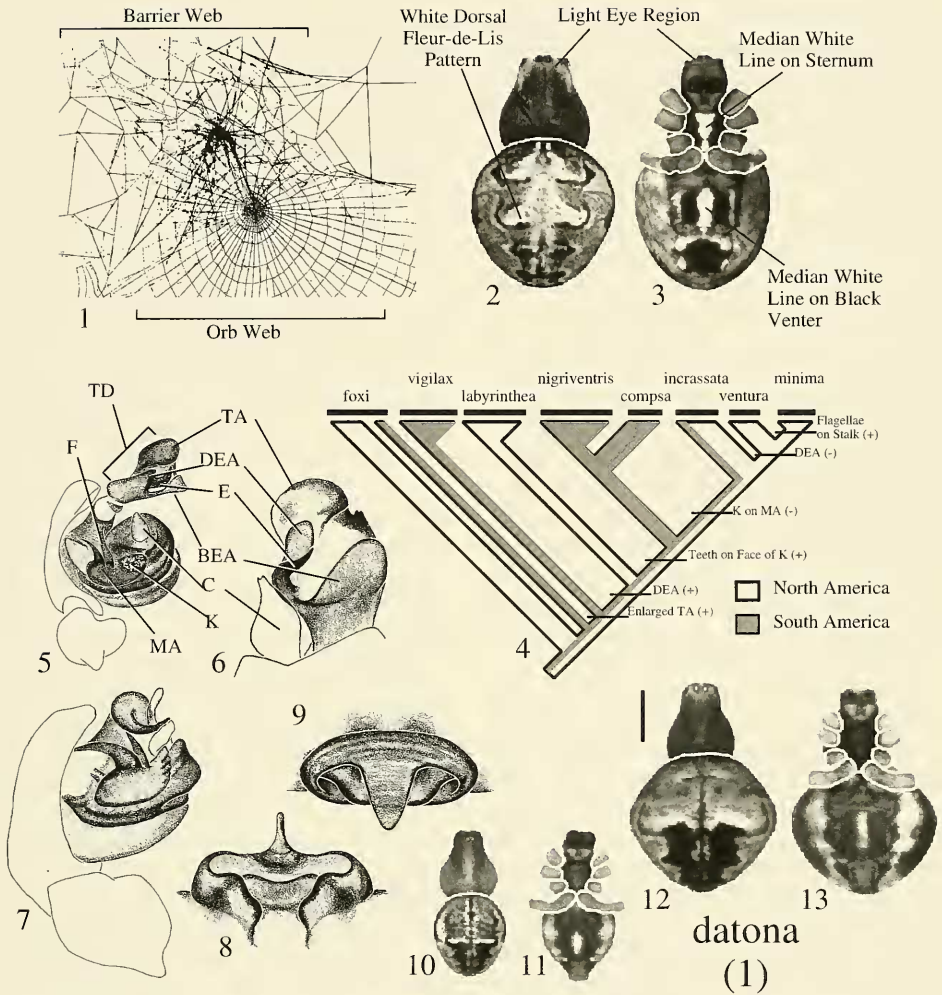


Figure 1. Web of immature *Metepeira grandiosa alpina* from Chihuahua, Mexico.
 Figure 2. Dorsum of adult female *Metepeira crassipes*.
 Figure 3. Venter of adult female *Metepeira tarapaca* new species.
 Figure 4. Hypothetical phylogenetic relationships among *Metepeira* species groups. Shaded branches indicate species groups that live in South America; open branches indicate species groups that live in North America, Central America, and the Caribbean.
 Abbreviations: DEA, distal embolic apophysis; K, keel of median apophysis; TA, terminal apophysis; (+), character state gain; (-), character state loss.
 Figures 5, 6. Male palpus. 5, mesal view, *Metepeira compsa*. 6, ventral view of distal embolic division, *Metepeira labyrinthea* (Hentz).
 Abbreviations: BEA, basal embolic apophysis; C, conductor; DEA, distal embolic apophysis; E, embolus; F, flagellum on median apophysis; K, keel of median apophysis; MA, median apophysis; TA, terminal apophysis; TD, terminal division.
 Figures 7–13. *Metepeira datona* Chamberlin and Ivie (sp. 1; 17°53'N, 76°19'W). 7, male palpus, mesal. 8, epigynum, posterior. 9, epigynum, ventral. 10, male, dorsal. 11, male, ventral. 12, female, dorsal. 13, female, ventral.
 Scale bar: dorsum and venter figures 1.0 mm.

era related to *Araneus*, *Metepeira* has concentrated macrosetae on femur I instead of tibia II (Scharff and Coddington, 1997). Female *Metepeira* have between two and five macrosetae on the anterior side of the femur, and between zero and seven on the anteroventral side. Males typically have more setae than their conspecific females: four to nine on the anterior side and two to nine on the anteroventral side. Variation in the number of macrosetae appears to correlate with body size. In most species, the male palpal tibia and patella each have two strong macrosetae (Levi, 1977, fig. 8).

Compared with other araneid genera, *Metepeira* have rather small and similar genitalia, which on the one hand makes the genus easy to recognize, but on the other hand makes species tough to identify. The small epigynum is fleshy, variable in shape, and weakly sclerotized. Unlike *Araneus*, *Metepeira*'s scape never has a pocket but always ends with a pointed tip (e.g., Fig. 31). The cleared epigynum—and in many cases the uncleared epigynum—reveals a pair of sclerotized spherical structures where the embolus is inserted, as well as ducts to pass semen to the larger, spherical seminal receptacles. In some species, these spherical structures are wide apart (e.g., Figs. 16, 17), in others they are tubular (e.g., Figs. 39, 40), but in many, they are closer together (e.g., Figs. 93, 94). Frequently the deeper, large seminal receptacles can be seen through uncleared tissue (e.g., Figs. 201, 295).

The male palp is more distinctive. In particular, the median apophysis (MA in Fig. 5), while not always a good character for separating closely related species, is excellent when it comes to identifying the genus. Two flagellae (F in Fig. 5) gracefully curve off the base of the median apophysis, and in some species, a toothed or smooth keel (K in Fig. 5) extends in the opposite direction. This design is also seen in *Kaira*, *Aculepeira*, and *Amazonpeira*, but none of these have flagellae that appear so integral to the base structure.

The terminal division on the *Metepeira*

palp is very similar in almost all species. When this structure is pulled up, a basal embolic apophysis (also known as an embolar lamella) can be seen in the shape of a club or spatula (E in Figs. 5, 6). Sometimes a distal embolic apophysis can be seen if it is not hidden from view by an overhanging terminal apophysis. When the terminal apophysis is large and sclerotized—which is the case in all but the *Metepeira foxi* species group—it has a recognizable toothed notch, like the mouth on a wrench (Fig. 6). Virgin males have a cap on the embolus that remains in the epigynum after mating and presumably serves as a barrier to subsequent mating (Levi, 1977). The shape of the embolus cap varies from tiny (e.g., Fig. 178) to short but wide (e.g., Fig. 199) to large and winged (Fig. 46). Finally, the terminal division lacks a stipes—a sclerite between the radix and the embolus that is frequently found in other genera related to *Araneus* (Scharff and Coddington, 1997).

Natural History. All *Metepeira* species build a unique web that combines an orb with a barrier web (Levi, 1977; Lopez, 1993). As with *Cyrtophora* Simon or *Mecynogea* Simon (Levi, 1997), the retreat of *Metepeira* hangs in the air, away from substrate, and is suspended by a scaffolding structure created by the barrier web (Fig. 1). The spider detects vibrations in the web and gains quick access to the hub using a signal line that runs from the retreat to the center of the orb (Fig. 1). Tan colored egg sacs are strung together, usually above the retreat, and the most recently laid eggs are nearest to the spider. In some species the egg sacs and retreat are decorated with insect parts (e.g., *M. spinipes*); in other species they are carefully wrapped by leaves and woven together (e.g., *M. datona*). Unlike the webs of *Cyrtophora* and *Mecynogea*, the orb web of *Metepeira* is oriented vertically, and the number of radii and sticky spirals are more typical of other araneines.

In some species, such as *M. pimungan* (personal observation) and, to a lesser de-

gree, *M. incrassata* (G. Uetz, personal communication), juveniles and adults without eggs will live on webs lacking a suspended retreat. Instead, the spider sits on a white disk-shaped stabilimentum in the center of the hub. Of 110 *M. pimumgan* specimens observed on San Miguel Island, about 40% occupied webs of this type. In two cases the disk stabilimenta were partly separated from the hub by barrier web lines and were further bent over to form a partly covered protective retreat for the spider. This observation makes it possible to imagine that the disk stabilimentum seen in *M. pimumgan* results from the fusion of the suspended retreat with the hub.

When food supplies are plentiful, spiders of all kinds show an increased tolerance for one another and an increased tendency to aggregate (e.g., Gillespie, 1987; Rypstra, 1986). The suspended retreats and barrier webs of *Metepeira*, *Cyrtophora*, and *Mecynogea* may actually further facilitate in the formation of aggregations by easing dependency on substrate availability and by providing a common support system (Burgess and Witt, 1976; Uetz, 1986). In any case, colony formation is known to occur in all three genera (e.g., Rypstra, 1979), but especially in *Metepeira*. Small colonial aggregations of two to 10 individuals occur in *M. datona* (Spiller and Schoener, 1989), *M. minima* (personal observation), *M. glomerabilis* (R. Baptista, personal communication), and *M. atascadero* new species (e.g., Uetz and Hodge, 1990). Medium-size colonies of 10 to 30 individuals occur in *M. pimumgan* (personal observation), *M. gressa* (Viera and Costa, 1988), *M. nigriiventris* (L. Rayor, personal communication), *M. tarapaca* (V. Roth, locality label), and *M. spinipes* (e.g., Uetz, 1988a). Large colonies, sometimes in the thousands of individuals, commonly occur in *M. incrassata* (e.g., Uetz and Hodge, 1990). Near rivers and in other lush habitats, *M. tarapaca* colonies can reach 200 individuals (M. Roy, personal communication). These cases of social be-

havior, broadly spread across seven different species groups, may mean that aggregation is a frequently lost and relatively old trait, or it may mean that species are prone to converge and evolve the same behavior independently.

Either way, much research has focused on elucidating the selective forces behind colonial behavior in *Metepeira*. In particular, Uetz (1988a,b, 1996) has provided strong support for the hypothesis that *Metepeira* forage using a risk-sensitive strategy. He suggests that spiders in abundant habitats seek to minimize individual variance in prey capture by aggregating in colonies, whereas spiders in poor habitats seek to maximize variance by living solitarily—perhaps in a risky attempt to find areas of local prey maxima. The diversity of social tendencies among species is therefore commensurate of the diversity of ecological habitats that they inhabit.

Indeed, *Metepeira* species thrive in a wide array of habitats, though often they are quite harsh. These include wet, montane cloud forests in Mexico and Panama (*M. incrassata*, *M. olmec*); tropical and wet agricultural areas (*M. uncatata*, *M. vigilax*, *M. glomerabilis*, *M. roraima*); high-elevation pine forests (*M. lacandon*, *M. nigriiventris*, *M. grandiosa alpina*); Canadian bogs (*M. grandiosa palustris*); deciduous forests in the eastern U.S. (*M. labyrinthea*); Caribbean coastal shrubbery (*M. datona*, *M. minima*, *M. triangularis*, *M. jamaicensis*, *M. maya*, *M. celestun*); Mexican mesquite grasslands (*M. atascadero*, *M. chilapae*); Patagonian dunes and scrub (*M. galathea*) and pampas grass (*M. karkii*); dry Californian buckwheat and sage (*M. crassipes*, *M. ventura*, *M. foxi*, *M. grandiosa grandiosa*); and arid and semiarid deserts (*M. arizonica*, *M. inca*, *M. ventura*, *M. crassipes*). Although some species (e.g., *M. galathea*, *M. spinipes*, *M. compsa*) cover vast geographic areas and live in many different habitats, many species are more biogeographically restricted. In fact, several species follow narrow ecological zones that decrease in elevation with distance

from the equator (e.g., *M. rectangula*, *M. vigilax*, *M. cajabamba*, Fig. 36; *M. arizonica*, Fig. 213).

Close cohabitation with different inter- and intrageneric species is not uncommon. Colonies of *M. incrassata* are known to contact webs of *Nephila clavipes* Linnaeus (Hodge and Uetz, 1996) and *Mecynogea ocosingo* and *Gasteracantha cancriformis* (personal observation). Often *M. crassipes*, *M. ventura*, *M. foxi*, and *M. grandiosa* are collected together (Levi, 1977), as are *M. minima* and *M. celestun* (personal observation). Species that have been collected from identical localities, though not necessarily at the same time, include: *M. chilapae* and *M. spinipes*; *M. chilapae* and *M. atascadero*; *M. karkii* and *M. galathea*; *M. calamuchita* new species, *M. gressa*, and *M. galathea*; *M. rectangula*, *M. calamuchita*, and *M. galathea*; *M. compsa* and *M. gressa*; *M. vigilax* and *M. compsa*; *M. glomerabilis* and *M. vigilax*; *M. compsa* and *M. glomerabilis*; *M. compsa* and *M. nigriventris*; *M. compsa* and *M. inca*; *M. datona* and *M. jamaicensis*; and *M. datona* and *M. triangularis*.

Despite the wide biogeographic ranges of *M. compsa* (Puerto Rico and south to Argentina, Map 8) and *M. datona* (Hispaniola and north to Florida, Map 1), they nonetheless come geographically close to one another but do not overlap. It is hard to imagine that the hurricanes that frequently pass through the Caribbean, as well as the homogeneous island environments, would not gradually cause these two species distributions to overlap. Perhaps these abrupt, disjunct distributions are a rare example of competitive exclusion in *Metepeira*, which in other species is not thought to be an important factor (Wise, 1983).

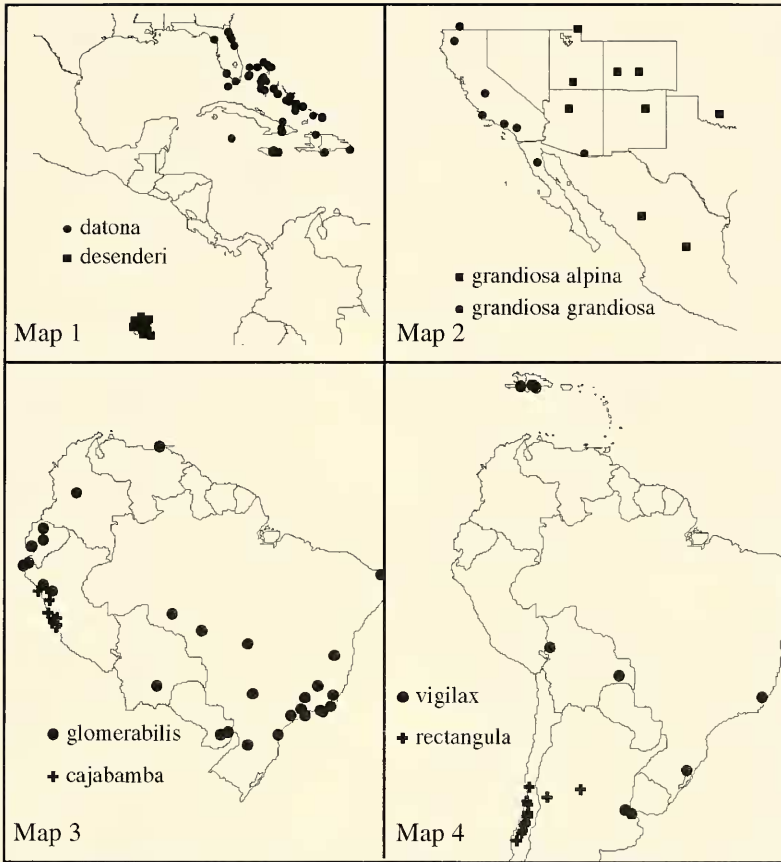
Sphecid wasps are predators on *Metepeira*. Locality labels indicated that *M. pacifica* has been found in the nests of *Trypargilum nitidum*, *T. tenocitlan*, and *T. bensoni*. Jiménez and Tejas (1994) report that *M. crassipes* is the most frequent prey item in the nests of *Trypargilum triden-*

tatum. Colonial spiders, such as *M. incrassata*, are especially vulnerable to wasps, other spiders, sarcophagid flies (e.g., *Archnidomyia lindae*, *A. rayorae*), and hummingbirds (Hieber and Uetz, 1990; Lopez, 1989; Rayor and Uetz, 1990).

Species Groups. Nearctic *Metepeira* were divided into two species groups: the *M. labyrinthea* group and the *M. foxi* group, based on the pattern on the sternum and the shape of the median apophysis (Levi, 1977). Baert (1987) questioned the taxonomic usefulness of the *M. foxi* species group (*M. foxi*, *M. grandiosa*, *M. datona*) because he found that *M. desenderi* has both a keel on the median apophysis and a white sternal line (Figs. 15, 21)—a combination that is incompatible by Levi's scheme. Nonetheless, the genitalia of *M. desenderi* closely ally this species with the *M. foxi* group, so I am redefining the *M. foxi* group based on purely genitalic characters. This is likely to be a basal, paraphyletic group (Fig. 4) (Piel and Nutt, 1997).

Seven additional species groups are distal to the *M. foxi*. These remaining species are united by sharing a large terminal apophysis that is sclerotized and usually studded with teeth or denticles. The *M. vigilax* group (*M. vigilax*, *M. cajabamba*, *M. glomerabilis*, *M. rectangula*) are united by large emboli with long scooplike basal embolic apophyses (Fig. 60). Unlike the remaining species, the terminal apophysis in this group—albeit large—does not actually overhang or hide the embolus. In addition to an overhanging terminal apophysis, the remaining taxa are also united by a distal embolic apophysis that either protrudes (Fig. 76), curves off (Fig. 185), or is secondarily lost (Fig. 264). The *M. labyrinthea* group (*M. labyrinthea*, *M. lacandon*, *M. spinipes*) share a toothless, smooth keel on the median apophysis (Figs. 67, 69).

The *M. nigriventris* group and the *M. compsa* group together share a median apophysis with teeth on the face of the keel (Figs. 92, 149). The *M. incrassata*



Maps 1, 2. *Metepeira foxi* species group. 1, *M. datona*, *M. desenderi*. 2, *M. grandiosa grandiosa*, *M. grandiosa alpina*.
 Maps 3, 4. *Metepeira vigilax* species group. 3, *M. glomerabilis*, *M. cajabamba*. 4, *M. vigilax*, *M. rectangularis*.

group, the *M. ventura* group, and the *M. minima* group all lack a keel on the median apophysis (Figs. 164, 222, 293). However, both the *M. compsa* group and the *M. incrassata* group have epigyna with similar oval or round sclerotized rims (Figs. 151, 166), so it is likely that these are paraphyletic and consist of species leading up to a major North American (without a keel) and South American (with a keel) phylogenetic split (Fig. 4).

The South American branch includes the *M. compsa* group (*M. compsa*, *M. ro-raima*, *M. gressa*) and, more distally, the *M. nigriventris* group (*M. nigriventris*, *M. tarapaca*, *M. calamuchita*, *M. galathea*, *M. karkii*). This latter group is united by a

distinctive and derived scape, which projects out and down, creating a noticeable arch and overhang (Fig. 86).

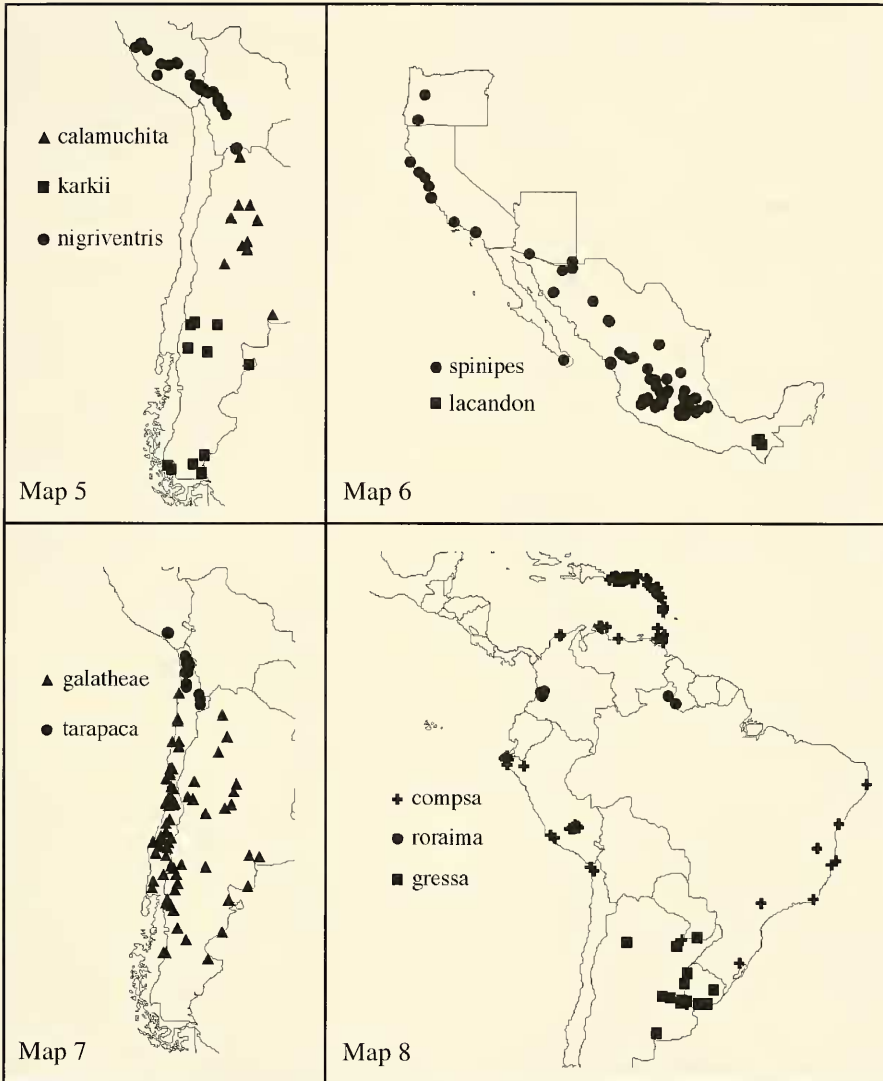
The remaining species all lack a keel on the median apophysis, and with one exception (*M. inca*), they live exclusively in North America (from the Caribbean and Panama to Nevada). The *M. incrassata* group (*M. gosoga*, *M. maya*, *M. inca*, *M. comanche*, *M. olmec*, *M. atascadero*, *M. arizonica*, *M. incrassata*, *M. triangularis*, *M. pimungan*) are very likely paraphyletic. The epigynum on each species seems autapomorphic and difficult to unite with any others. Some species (*M. gosoga*, *M. maya*, *M. inca*) have a pointed or projecting distal embolic apophysis (Fig. 171). Others have

a distal embolic apophysis that curves off sharply but does not project forward (Fig. 185). Finally, others have a distal embolic apophysis that curves off gently, almost to the point of hiding the existence of an apophysis (Fig. 206).

The *M. minima* group (*M. jamaicensis*, *M. minima*, *M. pacifica*, *M. petatlan*) and the *M. ventura* group (*M. uncata*, *M. ventura*, *M. celestun*, *M. chilapae*, *M. revillagigedo* new species, *M. crassipes*) are united by derived characters: both have thin flagellae arising from a thin base on the median apophysis (Fig. 264), and both share the secondary loss of the distal embolic apophysis. The *M. minima* group is clearly monophyletic; its species all have their flagellae further set off from the median apophysis on a separate, narrow stalk (Fig. 286).

KEY TO FEMALE *METEPEIRA*

- 1 Epigynal openings strongly sclerotized, round but tilted so that they appear oval from a ventral view (Figs. 40, 48, 55) 2
- Epigynal openings weakly sclerotized (e.g., Fig. 208), and if round, they are not tilted and do not appear oval from a ventral view (Fig. 131) 4
- 2(1) Epigynal openings shaped like the entrance to a snail shell (Fig. 55); Hispaniola, Brazil, Argentina (Map 4) (7) *vigilax*
- Epigynal openings tubular (Figs. 40, 48) 3
- 3(2) Epigynal openings strongly tilted (Fig. 40); Peru (Map 3) (5) *cajabamba*
- Epigynal openings weakly tilted (Fig. 48); Colombia to Brazil (Map 3) (6) *glomerabilis*
- 4(1) Epigynal openings large and gaping, creating large atria inside (Figs. 61, 62); Chile and Argentina (Map 4) (8) *rectangula*
- Epigynal openings not gaping and not creating large atria (e.g., Fig. 69) 5
- 5(4) Weak posterior lobes on the epigynum create a single, wide epigynal depression (Figs. 9, 17, 24, 31) or epigynum with crescent-shaped sclerotized openings on either side of a thin scape (Levi, 1977, fig. 87). Dark, sclerotized spheres below epigynal openings are greatly separated (Figs. 8, 16) 6
- Stronger posterior lobes on the epigynum create separate, smaller epigynal depressions that are not crescent-shaped, or if crescent-shaped, the scape is thick and puffy (e.g., Figs. 86, 102, 143, 166, 187, 208). Dark, sclerotized spheres below epigynal openings are closer together (e.g., Figs. 101, 142) 11
- 6(5) Sternum with longitudinal white line (Fig. 21); Galapagos Islands (Map 1) (2) *desenderi*
- Sternum entirely black or brown (Figs. 13, 28, 35) 7
- 7(6) Abdomen wider than long (Fig. 12); Florida to Hispaniola (Map 1) (1) *datona*
- Abdomen longer than wide (Figs. 27, 34) 8
- 8(7) Coxae as black as sternum (Levi, 1977, fig. 98); Canada-U.S. border (Levi, 1977, map 2) (Levi, 1977: 212) *grandiosa palustris*
- Coxae yellow or orange and lighter than sternum (Figs. 28, 35) 9
- 9(8) Epigynum with crescent-shaped sclerotized openings on either side of the scape (Levi, 1977, fig. 87); western U.S. and Canada (Levi, 1977, map 2) (Levi, 1977: 210) *foxi*
- Epigynum with wide, transverse depressions (Figs. 23, 24, 30, 31) 10
- 10(9) Scape wide and stubby (Fig. 24); Baja California north to Canada (Map 2) (3) *grandiosa grandiosa*
- Scape triangular (Fig. 31); in mountains from north-central Mexico to Canada (Map 2) (4) *grandiosa alpina*
- 11(5) Scape thickness equal to greater than width of epigynal depressions (e.g., Figs. 86, 119, 131, 143, 180, 201, 266) 12
- Scape narrower than epigynal depressions, or epigynal depressions in the shape of longitudinal slits (e.g., Figs. 238, 252, 280) 35
- 12(11) Base of scape originates anteriorly and projects ventrally before curving posteriorly. This projection creates an overhang and a noticeable gap between the scape and the genital openings (e.g., Figs. 85, 86, 101, 102, 119, 143) 13
- Scape does not create a noticeable gap or overhang (e.g., Figs. 77, 78, 130, 131, 165, 166, 265) 18
- 13(12) Rim of epigynal depressions slightly sclerotized and oval-shaped (Fig. 143); northern Brazil, French Guiana, and Colombia (Map 8) (17) *roraima*
- Epigynal depressions without distinct rim (Fig. 123) or not sclerotized (e.g., Fig. 102) 14
- 14(13) Sternum black, coxae mostly black (Fig.

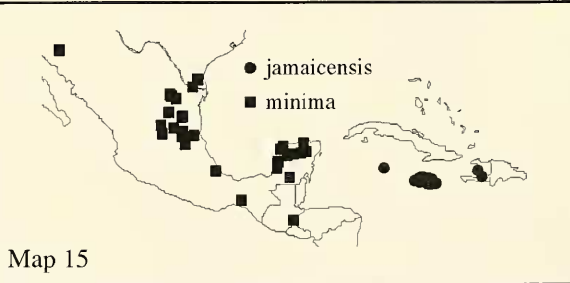
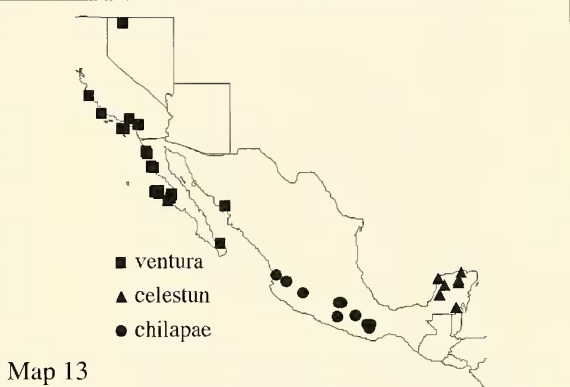
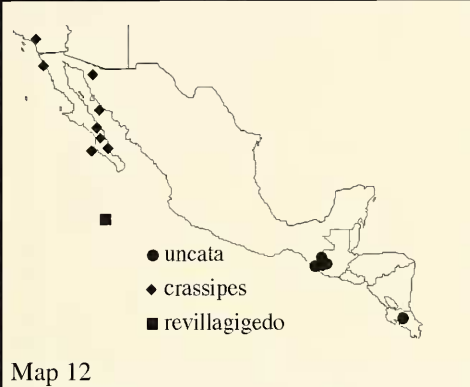
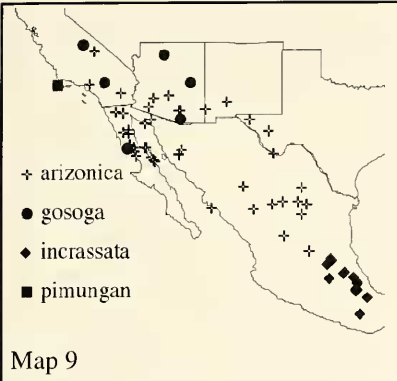


Maps 5, 7. *Metepeira nigriventris* species group. *M. calamuchita*, *M. karkii*, *M. nigriventris*, *M. galathea*, *M. tarapaca*.
Map 6. *Metepeira labyrinthea* species group. *M. spinipes*, *M. lacandon*.
Map 8. *Metepeira compsa* species group. *M. compsa*, *M. roraima*, *M. gressa*.

91), and carapace without lighter median mark (Fig. 90); high altitudes in Bolivia and Peru near Lake Titicaca (Map 5) (11) *nigriventris*
— Sternum with median white line (Fig. 99), or if sternum is black, then either the carapace has a median lighter arrow-shaped mark (Fig. 113) or the coxae are mostly yellow (Figs. 114, 128) 15

15(14) Sternum brown to black with parallel lines on either side of median white line on venter: the parallel lines are thicker anteriorly than posteriorly (Fig. 128). Lower lip on epigynum thick and bulbous (Fig. 123); southern Argentina and southern Chile (Map 5) (15) *karkii*
— Sternum with median white line, or if sternum is entirely brown to black, then parallel lines on either side of

- white line on venter are either absent (Fig. 114) or equally thick anteriorly as posteriorly (Fig. 99). Epigynum without thickened lower lip (Figs. 94, 102, 118, 119, 120) 16
- 16(15) Dark, sclerotized spheres in epigynal openings small (Figs. 119, 120). Anterior lip of epigynum rounded off, sometimes with openings shifted posteriorly and wrinkled portion of the scape's hood shifted more to the epigynum proper (Fig. 118); Chile and Argentina (Map 7) (14) *galathea*
- Dark, sclerotized spheres in epigynal openings large, and anterior lip of epigynum not rounded off. Openings always located midway down the epigynum (Figs. 94, 102) 17
- 17(16) General shape of epigynum is triangular with posterior width greater than anterior width. Scooped-out depressions project more posteriorly than laterally (Fig. 102); north-central Argentina (Map 5) (13) *calamchita*
- General shape of epigynum square. Scooped-out depressions project more laterally than posteriorly (Fig. 94); northern Chile and southern Peru (Map 7) (12) *tarapaca*
- 18(12) Epigynal openings almond-shaped, not noticeably sclerotized, and at a 40° to 60° angle from axis of spider (Figs. 69, 78) 19
- Epigynal openings not almond-shaped (e.g., Figs. 180, 187, 201), or if almond-shaped, slightly sclerotized and at an angle from spider's axis of 80° to 100° (Figs. 151, 159, 166) 22
- 19(18) Almond-shaped openings created by depression where scape arises from epigynum (Fig. 173); California, Arizona, northwestern Mexico (Map 9) (21) *gosoga*
- Almond-shaped openings created by membranes inside depressions and not associated with scape (Figs. 69, 78) 20
- 20(19) Distinct C-shaped depression created where the scape arises from the epigynum (Fig. 78). Black marks inside almond-shaped openings not cross-eyed in appearance (Fig. 78). Black sternum, usually with white spot in center (Fig. 83); mountainous regions of Chiapas, Mexico (Map 6) (10) *lacandon*
- Indistinct depression created where the scape arises from the epigynum (Fig. 69). Black marks inside almond-shaped openings cross-eyed in appearance (Fig. 69). Sternum black, with or without a median white line. If with only a portion of a median white line present, usually only at the posterior end of the sternum (Fig. 75). Never with only one white spot in center 21
- 21(20) Because of interspecific variability and polymorphism, females of the following two species are almost impossible to separate reliably without molecular sequence data. Small ribosomal subunit (12S) mtDNA sequence data has the following diagnostic markers. Base 14261: ACGGT; base 14285: ATTTT; base 14361: ACTAC; base 14394: CTTAT; base 14412: ATTA. (Base numbers refer to homologous sites in the mitochondrion of *Drosophila yakuba*, as reported by Clary and Wolstenholme [1985].) One quarter of scape extends below lower lips of epigynum (Levi, 1977, fig. 14); New England to Florida and west to eastern Texas (Levi, 1977, map 1, but not including points appearing in Mexico) (Levi, 1977: 196) *labyrinthea*
- For 12S mtDNA sequence data, the following sequences are diagnostic. Base 14261: ACGAT; base 14285: ATCTT; base 14361: ACCAC; base 14394: CTAAT; base 14412: TTTA. One third of scape extends below lower lips of epigynum (Levi, 1977, fig. 21; Fig. 69); Mexico City north to California (Map 6) (9) *spinipes*
- 22(18) Epigynal openings small, round, and sclerotized (Fig. 131). Openings sometimes hidden by wide scape (Fig. 134); Puerto Rico to Argentina and Chile (Map 8) (16) *compsa*
- Epigynal openings not small, round, and sclerotized 23
- 23(22) Rim of epigynal openings sclerotized and in an oval or teardrop shape (Figs. 151, 159, 166, 187) 24
- Rim of epigynal openings not sclerotized in an oval or teardrop shape (Figs. 180, 194, 201, 208) 27
- 24(23) Epigynal openings oval, small, and partly hidden by scape (Fig. 151); northern Argentina, Uruguay, and southern Brazil (Map 8) (18) *gressa*
- Epigynal openings teardrop-shaped (Fig. 187) or large and oval but not hidden by scape (Figs. 159, 166) 25
- 25(24) Epigynal openings teardrop-shaped (Fig. 187); northeastern Mexico to Texas (Levi, 1977, map 1; Map 11) (23) *comanche*
- Epigynal openings oval-shaped (Figs. 159, 166) 26
- 26(25) Lower lip of epigynum pointed (Fig. 166), abdomen white (Fig. 169); northern tip of Peru (Map 11) (20) *inca*



Maps 9, 11, 14. *Metepeira incrassata* species group. 9, *M. arizonica*, *M. gosoga*, *M. incrassata*, *M. pimungan*. 11, *M. comanche*, *M. inca*, *M. olmec*. 14, *M. maya*, *M. atascadero*, *M. triangularis*.
Maps 10, 15. *Metepeira minima* species group. 10, *M. pacifica*, *M. petatlan*. 15, *M. minima*, *M. jamaicensis*.
Maps 12, 13. *Metepeira ventura* species group. 12, *M. uncata*, *M. crassipes*, *M. revillagigedo*. 13, *M. ventura*, *M. celestun*, *M. chilapae*.

- Lower lip of epigynum thickened but not pointed (Fig. 159), abdomen dark (Fig. 162); southern Mexico and Belize to Costa Rica (Map 14) (19) *maya*
- 27(23) Rim of epigynal openings sclerotized and shaped like a pair of sunglasses (Fig. 201); eastern Cuba and Hispaniola (Map 14) (25) *triangularis*
- Rim of epigynal openings not sclerotized or, if sclerotized, not in shape of sunglasses (e.g., Figs. 208, 224) 28
- 28(27) Posterior epigynal lobes converge behind the scape so that epigynal depressions appear closed off from ventral view (Figs. 180, 208, 216, 224) 29
- Posterior epigynal lobes end before they disappear behind the scape so that epigynal depressions appear open poste-

- riorly from ventral view (Figs. 194, 245, 259, 266) 32
- 29(28) Scape relatively long and thin, epigynal depressions large and round, large black spheres take up almost all the space in the depressions (Fig. 180); southern Veracruz to Panama (Map 11) (22) *olnec*
- Scape relatively short, fat, and fleshy. Epigynal depressions not perfectly round; black spheres do not take up most of the space in the depression (Figs. 208, 216, 224) 30
- 30(29) Epigynum puffy, scape so thick that depressions on either side of scape appear crescent-shaped (Fig. 208); southwestern U.S. to central Mexico (Map 9) (26) *arizonica*
- Epigynum not puffy, scape not so fat that depressions become crescent-shaped (Figs. 216, 224) 31
- 31(30) Very social. Epigynal depressions large, disk-shaped, with shiny-smooth sclerotized inner surfaces and thin posterior lips (Fig. 224). Sternum mostly black, sometimes with anterior white marks. Venter without U-shaped mark circumscribing median white line posteriorly. Coxae mostly dark brown (Fig. 228); mainly in southern Veracruz (Map 9) (28) *incrassata*
- Mostly solitary. Epigynal depressions small, oval, with reduced shiny-smooth sclerotized surfaces and thick posterior lips (Fig. 216). Sternum with median white line or only white mark at posterior end. Venter with U-shaped mark circumscribing median white line posteriorly. Coxae mostly yellow (Fig. 221); central Mexican plateau (Map 14) (27) *atascadero*
- 32(28) Small square-shaped epigynal depressions on either side of scape (Figs. 259, 266) 33
- Large, more rounded epigynal depressions (Fig. 194) or with straight to S-shaped edges mostly covered by scape (Fig. 245) 34
- 33(32) Dark spheres inside epigynal depressions appear slightly walleyed. Scape relatively narrower at base: about the width of the depressions (Fig. 266); southeast and south-central Mexico (Map 13) (34) *chilapae*
- Dark spheres inside epigynal depressions appear slightly cross-eyed. Scape relatively wider at base: about twice the width of the depressions (Fig. 259); northwestern Mexico and California (Map 12) (33) *crassipes*
- 34(32) Large, rounded epigynal depressions with large black spheres inside (Fig. 194). Sternum black with posterior dewdrop-shaped mark. Pair of short parallel lines on either side of ventral median white line (Fig. 198). Carapace with large anterior white region (Fig. 197); San Nicolas Island off southern California (Map 9) (24) *pimungan*
- Epigynal depressions with straight to slightly S-shaped edges, mostly hidden by a wide triangular scape (Fig. 245). Sternum with wide median white line. No parallel white lines on either side of ventral median white line (Fig. 249). Carapace with small anterior white region (Fig. 248); Yucatan Peninsula (Map 13) (31) *celestun*
- 35(11) Epigynal depressions wider than long (Figs. 231, 252) 36
- Epigynal depressions longer than wide (e.g., Figs. 238, 273, 280, 288) 37
- 36(35) Black comma shapes inside epigynal depressions (Fig. 231). Sternum with median white line (Fig. 235). Dorsum lightly pigmented (Fig. 234); northwestern Mexico and coastal California (Map 13) (29) *ventura*
- Black S-shaped marks inside epigynal depressions (Fig. 252). Sternum black with dewdrop mark at posterior end (Fig. 256). Dorsum darkly pigmented (Fig. 255); Guatemala and Costa Rica (Map 12) (32) *uncata*
- 37(35) Epigynal depressions indistinct anteriorly. Black comma-shaped marks inside depressions and covered by translucent membranes (Fig. 238); Isla Socorro of the Archipiélago de Revillagigedo (Map 12) (30) *revillagigedo*
- Epigynal depressions distinct anteriorly. Black spheres shifted laterally and located outside the depressions (e.g., Figs. 273, 280, 295) 38
- 38(37) Epigynal depressions slit-shaped and usually narrower than scape (Figs. 280, 281); northwestern Mexico and Yucatan Peninsula (Map 15) (36) *minima*
- Epigynal depressions oval and wider than scape (Figs. 273, 288) 39
- 39(38) Dark spheres larger than epigynal openings (Fig. 273); west coastal Mexico (Map 10) (35) *petatlan*
- Dark spheres smaller than epigynal openings (Figs. 288, 295) 40
- 40(39) V-shaped ridge under the scape. Dark spheres located behind the junction where the ridge meets the lateral edge of the epigynal depressions (Fig. 288); Honduras to Costa Rica (Map 10) (37) *pacifica*
- Straight ridge under the scape. Dark

spheres located laterally and outside of the junction where the ridge meets the lateral edge of the epigynal depressions (Fig. 295); Cayman Islands, Jamaica, and Haiti (Map 15) (38) *jamaicensis*

KEY TO MALE *METEPEIRA*

- 1 Terminal apophysis thin, small, fleshy, without teeth or sclerotized parts (Figs. 7, 15, 22, 29) 2
- Terminal apophysis enlarged, meaty, with teeth or sclerotized parts (e.g., Figs. 38, 60, 84, 199) 7
- 2(1) Terminal apophysis narrow; embolus curled clockwise like the tip on a corkscrew (Figs. 7, 15) 3
- Terminal apophysis wide; embolus tilted up and L-shaped (Figs. 22, 29) 4
- 3(2) Curled embolus with a ridge on the upper surface and raised on a pedicel; basal embolic apophysis enormous (Fig. 15). Sternum with wide median white line (Fig. 21); Galapagos Islands (Map 1) (2) *desenderi*
- Curled embolus smooth on its upper surface and not raised on a pedicel; basal embolic apophysis hardly noticeable (Fig. 7). Sternum entirely black (Fig. 11); Florida to Hispaniola (Map 1) (1) *datona*
- 4(2) L-shaped embolus at an acute ($< 90^\circ$) angle (Levi, 1977, figs. 91-93); western U.S. and Canada (Levi, 1977, map 2) (Levi, 1977: 210) *foxi*
- L-shaped embolus at angle of 90° or greater (Figs. 22, 29) 5
- 5(4) Median apophysis with rounded projection on dorsal side; jagged posterior edge of keel (Figs. 22, 29) 6
- Median apophysis without projection—flat on dorsal side; rounded posterior edge of keel (Levi, 1977, fig. 105); along the Canadian and U.S. border, north to Nova Scotia and British Columbia, south to Maine and North Dakota (Levi, 1977, map 2) (Levi, 1977: 212) *grandiosa palustris*
- 6(5) Lower, transverse part of L-shaped embolus longer than vertical part (Fig. 29); mountains from north-central Mexico to Canada (Map 2) (4) *grandiosa alpina*
- Lower, transverse part of L-shape embolus shorter than or equal to vertical part (Fig. 22); Baja California north to Canada (Map 2) (3) *grandiosa grandiosa*
- 7(1) Terminal apophysis does not entirely overhang the embolus. Embolus long and robust, with a long and thin gap created between the embolus and the basal embolic apophysis (Figs. 38, 46, 53, 60) 8
- Terminal apophysis often overhangs the embolus, covering it from view. Embolus not long and robust, without long, thin gap between embolus and basal embolic apophysis (e.g., Figs. 67, 79, 92, 121, 141, 185) 11
- 8(7) Longer flagellum as thick as shorter flagellum. Keel short, slim, and feather-shaped. Embolus as wide as base of median apophysis (Fig. 53); Hispaniola, Brazil, Argentina (Map 4) (7) *vigilax*
- Longer flagellum thicker than shorter flagellum. Keel absent (Fig. 38) or wide and arrowhead-shaped. Embolus thinner than base of median apophysis (Figs. 38, 46, 60) 9
- 9(8) Keel absent or greatly reduced (Fig. 38); Peru (Map 3) (5) *cajabamba*
- Keel present (Figs. 46, 60) 10
- 10(9) Large embolus as long as basal embolic apophysis (Fig. 60). Normal embolic cap; Chile and Argentina (Map 4) (8) *rectangula*
- Small embolus shorter than basal embolic apophysis, often seen with winged embolic cap (Fig. 46); Colombia to Brazil (Map 3) (6) *glomerabilis*
- 11(7) Median apophysis with keel (e.g., Figs. 92, 141) 12
- Median apophysis without keel (e.g., Figs. 157, 178, 286); all North American or Caribbean species except for *M. inca* 22
- 12(11) Keel without teeth; smooth (e.g., Figs. 67, 76); North America 13
- Keel with teeth on face; rough (e.g., Figs. 84, 92, 100); South America 15
- 13(12) Distal embolic apophysis sleek, pointed, and feather-shaped when viewed from underside of terminal division (Fig. 70); Mexico City north to California (Map 6) (9) *spinipes*
- Distal embolic apophysis spoon-shaped (Fig. 6) or widened with bump (Fig. 79) 14
- 14(13) Distal embolic apophysis spoon-shaped (Fig. 6). Sternum reddish brown with median white line. New England to Florida and west to eastern Texas (Levi, 1977, map 1, excluding points in Mexico) (Levi, 1977: 196) *labyrinthea*
- Distal embolic apophysis widened with bump (Fig. 79). Sternum black with or without faint white mark in center (Fig. 81); mountainous regions of Chiapas, Mexico (Map 6) (10) *lacandon*
- 15(12) Distal embolic apophysis a simple extension that projects forward, parallel to the embolus. Keel usually rounded

- (Fig. 129); Puerto Rico to Argentina and Chile (Map 8) (16) *compsa*
- Distal embolic apophysis raised up or projected away from the embolus. Keel usually pointed or jagged (Figs. 84, 92, 100, 121, 141, 149) 16
- 16(15) Distal embolic apophysis points up and away from the embolus. Keel usually jagged (Figs. 141, 149) 21
- Distal embolic apophysis wide and raised up on boss. Keel usually pointed (Figs. 84, 92, 100) 17
- 17(16) Dewlap extension under embolus (Fig. 100) curves under, narrowing the gap between the embolus and the basal embolic apophysis by one-half (Fig. 103); north-central Argentina (Map 5) (13) *calamuchita*
- No such dewlap (Figs. 84, 92, 110, 121). Gap between embolus and basal embolic apophysis narrow by less than one-half the widest distance (Figs. 87, 95, 117, 124) 18
- 18(17) Outside edge of distal embolic apophysis gently rounded when viewed from underside of terminal division (Fig. 124); southern Argentina and southern Chile (Map 5) (15) *karkii*
- Outside edge of distal embolic apophysis with distinct bump when viewed from underside of terminal division (Figs. 87, 95, 117) 19
- 19(18) Outside edge of distal embolic apophysis with rounded bump that is sclerotized and has a distinct line rising up from embolus (Fig. 117); Chile and Argentina (Map 7) (14) *galathea*
- Outside edge of distal embolic apophysis with pointed bump, less sclerotized than embolus proper and without a distinct line rising up from the embolus (Figs. 87, 95) 20
- 20(19) Thick neck joining embolus and basal embolic apophysis. Bump on distal embolic apophysis peeks out from under the terminal apophysis (Figs. 92, 95). Sternum usually with white spot or median white line (Fig. 97); northern Chile and southern Peru (Map 7) (12) *tarapaca*
- Thin neck joining embolus and basal embolic apophysis. Bump on distal embolic apophysis does not peek out from under the terminal apophysis (Figs. 84, 87). Sternum always black, general coloration dark (Figs. 88, 89); high altitudes in Bolivia and Peru near Lake Titicaca (Map 5) (11) *nigriventris*
- 21(16) Distal embolic apophysis thinner than embolus near the junction of the two. Embolus tip is curved gently (Fig. 149); northern Argentina, Uruguay, and southern Brazil (Map 8) (18) *gressa*
- Distal embolic apophysis the same size as embolus near the junction of the two. Embolus tip is curved abruptly (Fig. 141); northern Brazil, French Guiana, and Colombia (Map 8) (17) *roraima*
- 22(11) Distal embolic apophysis a projecting bump (Figs. 157, 164, 171) 23
- Distal embolic apophysis curved off (Figs. 178, 185, 199, 214), rounded (Figs. 192, 206), or absent (Figs. 264, 278, 293) 25
- 23(22) Distal embolic apophysis raised up from the embolus and pointed (Fig. 171); California, Arizona, northwestern Mexico (Map 9) (21) *gosoga*
- Distal embolic apophysis not raised up, but projecting forward and rounded off (Figs. 157, 164) 24
- 24(23) Main flagellum on median apophysis thin and initially as thick as base. Embolus and embolic cap shortened (Fig. 164); northern tip of Peru (Map 11) (20) *inca*
- Main flagellum on median apophysis thick, but initially thinner than base. Embolus and embolic cap elongated (Fig. 157); southern Mexico and Belize to Costa Rica (Map 14) (19) *maya*
- 25(22) Embolus shaped like the nib on a fountain pen, with bump near tip on opposite side of distal embolic apophysis (Figs. 214, 217); central Mexican plateau (Map 14) (27) *atacadero*
- Embolus without such bump near tip (e.g., Fig. 222) 26
- 26(25) Distal embolic apophysis abruptly ends in sharp curve and flagellae not set off on a narrow stalk (Figs. 178, 185, 199, 222) 27
- Distal embolic apophysis gently curved off (Figs. 229, 236, 243), rounded (Figs. 192, 206), or absent (e.g., Fig. 293) 30
- 27(26) Flagellae very thin and equal in length. Embolus long and arching, with wide but short embolus cap. Overhanging terminal apophysis covers only a distal portion of the sclerotized part of the embolus (Fig. 199); eastern Cuba and Hispaniola (Map 14) (25) *triangularis*
- Flagellae normal in thickness and usually of different lengths. Terminal apophysis centered above the entire sclerotized portion of the embolus (Figs. 178, 185, 222) 28
- 28(27) Not known to be very social. Height of embolus plus distal embolic apophysis just before the latter curves off sharply is equal to or greater than length of embolus tip distal to this point (Figs.

- 178, 185). Sternum with median white markings (Figs. 182, 189) 29
- Highly social species. Height of embolus plus distal embolic apophysis just before the latter curves off sharply is less than the length of the embolus tip distal to this point (Fig. 222). Sternum mostly black; sometimes with anterior white marks. Coxae mostly dark brown (Fig. 226); mainly in southern Veracruz, Mexico (Map 9) (28) *incrassata*
- 29(28) Darker, sclerotized portion of the embolus does not extend over the hump of the distal embolic apophysis. Base of embolus narrower than widest part of the first flagellum (Fig. 178); southern Veracruz, Mexico to Panama (Map 11) (22) *olnec*
- Darker, sclerotized portion of the embolus extends over the hump of the distal embolic apophysis. Width of embolus base the same or greater than widest part of the first flagellum (Fig. 185); northeastern Mexico to Texas (Levi, 1977, map 1; Map 11) (23) *conanche*
- 30(26) Distal embolic apophysis rounded off to form convex curve (Figs. 192, 206) 31
- Distal embolic apophysis gently falls off to form concave shape (Figs. 229, 236, 243) or absent (e.g., Fig. 293) 32
- 31(30) Embolus S-shaped (Fig. 192). Sternum black with posterior white mark. Venter without white anchor shape mark (Fig. 196); San Nicolas Island off southern California (Map 9) (24) *pimungan*
- Embolus convex on upper surface, straight on lower surface (Fig. 206). Sternum black with median white line. Venter with faint white anchor-shaped mark posterior to median white line (Fig. 210); southwestern U.S. to central Mexico (Map 9) (26) *arizonica*
- 32(30) Flagellae on median apophysis set off on separate, narrow, stalk (e.g., Figs. 278, 286) 38
- Flagellae on median apophysis not set off on a separate, narrow, stalk (e.g., Figs. 229, 264) 33
- 33(32) Larger flagellum twice as wide as smaller flagellum (Fig. 236); Isla Socorro of the Archipiélago de Revillagigedo (Map 12) (30) *revillagigedo*
- Larger flagellum less than twice as thick as smaller flagellum (e.g., Figs. 229, 243) 34
- 34(33) Flagellae on median apophysis relatively thin (Figs. 250, 264) 35
- Flagellae on median apophysis thicker (Figs. 229, 243, 257) 36
- 35(34) Embolus with sharp bend near the tip (Fig. 264). Sternum with median white line (Fig. 268); southeast and south-central Mexico (Map 13) (34) *chilapae*
- Embolus with gentle bend further from the tip (Fig. 250). Sternum mostly black with small white mark at posterior end of sternum (Fig. 254); Guatemala and Costa Rica (Map 12) (32) *uncata*
- 36(34) Embolus with sharp bend near the tip (Fig. 229); northwestern Mexico and coastal California (Map 13) ... (29) *ventura*
- Embolus with gentle bend further from the tip (Figs. 243, 257) 37
- 37(36) Sclerotized portion of embolus about as long as the longer flagellum (Fig. 243); Yucatan Peninsula (Map 13) (31) *celestun*
- Sclerotized portion of embolus shorter than the longer flagellum (Fig. 257); northwestern Mexico and California (Map 12) (33) *crassipes*
- 38(32) Embolus thick and tapering to a point (Figs. 271, 278) 39
- Embolus thin and needlelike (Figs. 286, 293) 40
- 39(38) Longer flagellum greater than half the length of the cymbium (Fig. 271); west coastal Mexico (Map 10) (35) *petatlan*
- Longer flagellum less than half the length of the cymbium (Fig. 278); northwestern Mexico and Yucatan Peninsula (Map 15) (36) *minima*
- 40(38) Flagellae set off on long, thin stalk (Fig. 293); Cayman Islands, Jamaica, and Haiti (Map 15) (38) *jamaicensis*
- Flagellae set off on short, thicker stalk (Fig. 286); Honduras to Costa Rica (Map 10) (37) *pacifica*

Metepeira foxi Group

The *M. foxi* species group (*sensu* Levi, 1977) and *M. desenderi* share very similar genitalia, especially among males. Consequently, I am expanding the *M. foxi* group to include *M. desenderi*, but with the exclusion of the black sternum as a diagnostic character. The *M. foxi* group (*sensu lato*) includes males with an embolus that lacks a distal apophysis. The embolus curls almost 180° clockwise around a reduced or fleshy terminal apophysis (Figs. 7, 15, 22, 29). In other species groups the embolus is straighter and does not curl (e.g., Fig. 60), and the terminal apophysis is large, overhanging the embolus, and often sclerotized with teeth (e.g., Fig. 121). Epigynal

features uniting females in the *M. foxi* species group are harder to discern. Generally speaking, the epigynum has a stubby, shorter, often triangular scape and weaker posterior lobes that permit a wider view into the epigynal openings (compare Figs. 9, 17, 24, 31 with Figs. 143, 252).

1. *Metepeira datona*

Chamberlin and Ivie

Figures 7–13, 312; Map 1

Metepeira datona Chamberlin and Ivie, 1942: 68, fig. 196, ♀. Female holotype from Daytona Beach, Florida, USA, in the AMNH, examined. Levi, 1977: 208–210, figs. 78–86, ♂, ♀. Brignoli, 1983: 275.

Metepeira inerna Bryant, 1945: 378. Female holotype from Cap Haïtien, Haiti in the MCZ, examined. First synonymized by Levi, 1977: 208–210.

Description. Female from Morant Point, Mammee Bay, Jamaica. Carapace light around eyes with short lateral posterior extensions, sometimes with thin longitudinal white line (Fig. 12). Legs ringed. Femur I with row of two macrosetae on anterior side; three light setae on anteroventral side. Anterior half of dorsal folium white, posterior half black, margined by white; two halves separated by transverse white line. Abdomen widest in center (Fig. 12). Venter with a longitudinal white line. Pair of white spots on either side of spiracle (Fig. 13). Sternum usually entirely black, though sometimes with thin anterior and posterior marks, suggestive of median white line (Fig. 13). Ratio of eye diameters: posterior medians and anterior medians 1.0, anterior laterals 1.3, posterior laterals 1.1. Anterior median eyes separated by 1.4 diameters, posterior median eyes by 0.9, anterior median eyes separated from anterior laterals by 1.6 diameters of anterior lateral eyes, lateral eyes separated by 0.3 their diameters. Total length 4.2 mm. Carapace 1.7 mm long, 1.4 wide. First femur 2 mm, patella and tibia 2.4, metatarsus 1.5, tarsus 0.8. Second patella and tibia 1.9 mm, third 1.1, fourth 1.6.

Male from Morant Point, Mammee Bay, Jamaica. Carapace yellowish brown, light

around eyes. Median white mark anterior to thoracic furrow (Fig. 10). Legs same color as carapace, lightly ringed. Femur I with row of three macrosetae on anterior side, two on anteroventral side. Center of dorsum with transverse white line; posterior half darker than anterior half; thin median black line; margin of folium white (Fig. 10). Venter, sternum as in female (Fig. 11). Ratio of eye diameters: posterior medians and anterior medians 1.0, anterior laterals 1.3, posterior laterals 1.2. Anterior median eyes separated by 1.8 diameters, posterior median eyes by 1.1, anterior median eyes separated from anterior laterals by 1.5 diameters of anterior lateral eyes, lateral eyes separated by 0.5 their diameters. Total length 3 mm. Carapace 1.4 mm long, 1.1 wide. First femur 2.7 mm, patella and tibia 2.7, metatarsus 1.9, tarsus 0.8. Second patella and tibia 2.1 mm, third 1.0, fourth 1.3.

Diagnosis. The dorsal folium and abdominal shape is distinctive in *M. datona*. Typically, the female's abdomen is widest in the middle, forming a rhomboid in shape (Fig. 12), and both sexes have a transverse white line dividing the dorsal folium, with wide black markings on the posterior half (Figs. 10, 12). A ventral view of the epigynum in *M. datona* reveals a ridge under the scape that almost forms a straight line and which curves up at the ends (Fig. 9) instead of a V-shape (Figs. 17, 24, 31). The openings to the epigynum consist of small slits that flank a wide depression (Fig. 9), compared to larger openings that are relatively closer together (Figs. 17, 24, 31). The smooth embolus on *M. datona* is somewhat more compressed as it curls clockwise like the tip on a corkscrew, in contrast to the slightly ridged embolus supported on a stalk (Fig. 15) or the strongly ridged and tilted embolus (Figs. 22, 29). Like *M. desenderi* (Fig. 15) but unlike *M. grandiosa grandiosa* (Fig. 22) and *M. grandiosa alpina* (Fig. 29), the posteroventral edge of the keel on the median apophysis is rounded, as opposed to pointed (Fig. 7). Finally, *M. datona* has the

thinnest and fleshiest terminal apophysis in the genus (Fig. 7).

Variation. Average body length of 15 females examined 3.8 mm, range 2.9 to 4.8 mm. Average body length of seven males examined 2.6 mm, range 1.8 to 3 mm.

Natural History. Mature adults have been collected throughout the year (Fig. 312). According to locality labels, *M. datona* are found near the beach on cactus, palm, low scrub, mangrove, and bamboo. Females are known to wrap their egg sacs in dead leaves.

Distribution. At sea level in Florida, Bahamas, British West Indies, and the Dominican Republic (Levi, 1977, map 2; Map 1).

Records Examined. BAHAMAS *Abaco Cays*: Abaco, 26°29'N, 77°5'W, 2.xii.1964 (W. B. Peck, MCZ); Allons Cay, 26°59'N, 77°40'W, 9.v.1953 (E. B. Hayden, AMNH); Hopetown, Elbow Cay, 26°33'N, 76°57'W, 5.v.1953 (E. Hayden, AMNH); New Plymouth, Green Turtle Cay, 26°50'N, 77°23'W, 7.v.1953 (G. Rabb, AMNH); Whale Cay, 26°43'N, 77°14'W, 12.i.1964 (W. B. Peck, CAS). *Acklin's Id.*: Atwood's Harbor, 22°13'N, 74°18'W, 15.ix.1958 (A. W. Scott Jr., MCZ); Salina Point, 22°13'N, 74°18'W, 15.viii.1958 (R. Robertson & A. W. Scott Jr., MCZ). *Andros*: Fresh Creek, 24°26'N, 77°57'W, 23.iv.1953 (L. Giovannoli, AMNH); Mangrove Cay, 24°15'N, 77°39'W, 26.iv.1953 (E. Hayden, AMNH); Nicolls Town, 25°8'S, 78°0'W, 14.iii.1967 (A. M. Nadler, AMNH). *Berry Islands*: Frazier's Hog Cay, 25°24'N, 77°50'W, 29.iv.1953 (E. Hayden, AMNH); Little Harbor Cay, 25°34'N, 77°43'W, 1.v.1953 (Hayden & Giovannoli, AMNH). *Crooked Island*: North shore of Cripple Hill, 22°49'N, 74°16'W, 15.ix.1958 (A. W. Scott Jr., MCZ); NW end, Gordon (= Gun) Bluff, 22°50'N, 74°20'W, 15.viii.1958 (R. Robinson & A. W. Scott Jr., MCZ). *Crooked Island Group*: Long Cay, 22°37'N, 74°20'W, 7.iii.1953 (Hayden & Giovannoli, AMNH). *East Plana Cay*: 22°37'N, 73°33'W, 4.iii.1953 (E. Hayden, AMNH). *Exumas*: Musha Cay, 23°50'N, 76°15'W, 29.xii.1985 (A. Boutard, MCZ); Warderick Wells Cay, 24°22'N, 76°36'W, 9.i.1953 (L. Giovannoli, AMNH), 11.i.1953 (Hayden & Giovannoli, AMNH). *Grand Bahamas Island*: Dundee Bay, 26°30'N, 79°15'W [?], 25.xii.1965 (L. Pinter, MCZ); near Fre port, pine-palmetto, 26°34'N, 78°27'W [?], 25.vii.1965 (L. Pinter, MCZ). *Long Island*: Clarence Town, 23°6'N, 74°59'W, 10.iii.1953 (L. Giovannoli, AMNH); Deadman's Cay, 23°14'N, 75°14'W, 11.iii.1953 (E. Hayden, AMNH). *New Providence Island*: 7 mi W. of Nassau, 25°5'N, 77°28'W, 4.i.1953 (Hayden & Giovannoli, AMNH). *North Bimini*: 25°44'N, 79°15'W, 25.i.1950 (C. M. Bogert, AMNH),

6.vi.1950 (M. Cazier & F. Rindge, AMNH), 15.v.1951 (W. J. Gertsch & M. Cazier, AMNH), 15.vi.1951 (M. Cazier, P. & C. Vaurie, AMNH), 15.vii.1951 (C. & P. Vaurie, AMNH), 13.xii.1952 (A. M. Nadler, AMNH), 28.xi.1959 (A. M. Nadler, AMNH). *Rum Cay*: near Port Nelson, 23°38'N, 74°50'W, 16.iii.1953 (Hayden & Giovannoli, AMNH). *South Bimini*: 25°42'N, 79°17'W, 12.vi.1950 (M. Cazier & F. Rindge, AMNH), 22.vi.1950 (M. Cazier & F. Rindge, AMNH), 15.v.1951 (W. J. Gertsch & M. Cazier, AMNH), 15.vii.1951 (C. & P. Vaurie, AMNH), 4.viii.1951 (C. & P. Vaurie, AMNH), 4.xii.1952 (A. M. Nadler, AMNH), 25.iii.1953 (A. M. Nadler, AMNH); Gun Cay, 25°35'N, 79°20'W, 15.vi.1951 (AMNH). BRITISH WEST INDIES *Caicos Islands*: Long Cay, 21°28'N, 71°33'W, 10.ii.1953 (E. Hayden, AMNH); South Caicos, from webs in upper beach zone, 21°31'N, 71°30'W, 3.iv.1973 (D. W. Buden, MCZ); West Caicos, 21°39'N, 72°28'W, 4.ii.1953 (Hayden & Giovannoli, AMNH), 5.ii.1953 (Hayden, Rabb, & Giovannoli, AMNH). *Grand Cayman Island*: 19°20'N, 81°10'W, 15.ii.1960 (R. A. Lewin, MCZ). CUBA *Oriente*: Banes, 20°58'N, 75°43'W, 2.viii.1955 (A. F. Archer, AMNH); Ensenada Nispero, Ciudadmar, 19°58'N, 75°52'W, 9.xi.1945 (P. Alayo, AMNH); Jurguá, 19°56'N, 75°40'W, 1.x.1955 (P. Alayo, AMNH); Santa Fé [?], 20°22'N, 75°53'W (A. F. Archer, AMNH). DOMINICAN REPUBLIC *Barahona*: Playa Los Patos, 17°58'N, 71°11'W, 31.viii.1976 (J. A. Ottenwalder, MNSD). *La Altagracia*: Punta Cana, Isla Saona, 18°8'N, 68°34'W (Felix E. Del Monte & K. Guerrero, MNSD). HAITI *Dept. du Nord*: Cap-Haïtien, 19°46'N, 72°13'W, 15.iii.1934 (E. Bryant, Utawana Exp., MCZ). JAMAICA *Portland*: between Boston and Blue Hole, 18°6'N, 76°37'W, 29.vii.1955 (A. F. Archer, AMNH). *Saint Andrews*: Hope Gardens, Gordontown, 18°2'N, 76°45'W, 27.vii.1955 (A. F. Archer, AMNH). *Surrey*: Morant Point, Mammee Bay, 17°53'N, 76°19'W, 14.x.1957 (A. M. Chickering, MCZ); Palisadoes, 17°56'N, 76°46'W, 11.xi.1967 (A. M. Chickering, MCZ); Palisadoes Area, 17°56'N, 76°46'W, 1.xi.1957 (A. M. Chickering, MCZ). U.S. VIRGIN ISLANDS *Saint Thomas*: Morant Point, 17°55'N, 76°10'W, 25.vii.1985 (G. B. Edwards, FSCA).

2. *Metepeira desenderi* Baert Figures 14–21, 307; Map 1

Epeira labyrinthea:—Banks, 1902: 60. Banks, 1924: 97. Misidentification.

Metepeira sp.:—Roth and Craig, 1970: 116.

Metepeira desenderi Baert, 1987: 145, figs. 16–21, ♂, ♀. Male holotype from Isla Pinzon, Galapagos, Ecuador, in the IRSNB. Platnick, 1989: 341.

Note. Holotype not examined because the figures in Baert (1987) are clear and because this is the only *Metepeira* species found on the Galapagos.

Description. Female from east slope of Isla Santa Cruz, Galapagos Islands, Ecua-

dor. Carapace yellowish brown, white around eyes, lighter median line (Fig. 20). Legs yellowish white, slightly darker annulations on distal ends of articles. Femur I with row of four macrosetae on anterior side; two to four on anteroventral side. Dorsal fleur-de-lis pattern broken into four white patches with anterior pair often larger than in most species. Posterior pair straighter than usual, forming a cross in center of folium (Fig. 20). Venter olive-brown with median white line surrounded by white U-shaped marking (Fig. 21). Pair of white spots on either side of spiracle. Sternum brownish black with wide, white line widening anteriorly (Fig. 21). Ratio of eye diameters: posterior medians and anterior medians 1.0, anterior laterals 1.3, posterior laterals 1.3. Anterior median eyes separated by 1.5 diameters, posterior median eyes by 0.9, anterior median eyes separated from anterior laterals by 2.3 diameters of anterior lateral eyes, lateral eyes separated by 0.2 their diameters. Total length 5.5 mm. Carapace 2.3 mm long, 1.7 wide. First femur 2.7 mm, patella and tibia 3, metatarsus 2.2, tarsus 0.8. Second patella and tibia 2.4 mm, third 1.4, fourth 2.

Male from same locality as female. Carapace yellowish brown with wide white median mark (Fig. 18). Legs ringed like female. Femur I with row of four macrosetae on anterior side; four to seven on anteroventral side. Dorsum and venter as in female, though median white line on sternum sometimes broken (Figs. 18, 19). Ratio of eye diameters: posterior medians and anterior medians 0.9, anterior laterals 1.2, posterior laterals 1.1. Anterior median eyes separated by 2.2 diameters, posterior median eyes by 1.4, anterior median eyes separated from anterior laterals by 2.3 diameters of anterior lateral eyes, lateral eyes separated by 0.5 their diameters. Total length 3.2 mm. Carapace 1.6 mm long, 1.3 wide. First femur 2.6 mm, patella and tibia 2.6, metatarsus 2.3, tarsus 0.8. Second patella and tibia 2.2 mm, third 1.0, fourth 1.6.

Diagnosis. Within the *M. foxi* species

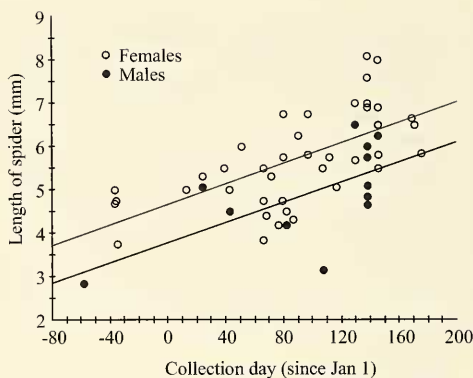


Figure 14. The length of mature *M. desenderi* collected on specific days of the year over a period of 84 years. There is a trend from smaller spiders early in the season to large spiders later in the season.

Scale of abscissa: -80 = October 12 of the previous year; 40 = February 9; 160 = June 9.

Symbols: Females (○), stippled regression line ($r^2 = 40\%$); males (●), solid regression line ($r^2 = 42\%$).

group, the female abdomen shape of *M. desenderi* is closest to *M. datona*, though not quite as rhomboid (compare Fig. 20 with Figs. 12, 27, 34). The scape on *M. desenderi* is narrower and less triangular than other *M. foxi* species, and the depression under the scape forms a distinct U-shaped smile that is not seen in the others (compare Fig. 17 with Figs. 9, 24, 31). Like *M. datona* (Fig. 7) but unlike *M. grandiosa grandiosa* (Fig. 22) or *M. grandiosa alpina* (Fig. 29), the posteroventral edge of the keel on the median apophysis is rounded as opposed to pointed (Fig. 15). Similar to *M. datona* (Fig. 7), the embolus of *M. desenderi* is curved like a slightly flattened corkscrew. Unlike *M. datona*, the embolus seems to be supported by a pedicel off a large basal embolic apophysis (Fig. 15). In contrast, a pedicel is not evident in *M. datona*, and the basal embolic apophysis is barely visible (Fig. 7).

Variation. Average body length of 45 females examined 5.8 mm, range 3.8 to 8.5 mm. Average body length of 13 males examined 4.9 mm, range 2.9 to 6.5 mm.

Natural History. Notes on the collection labels of Y. Lubin and R. Silberglied indicate that *M. desenderi* is active at night

and that the retreat is composed of *Opuntia* bark and croton leaves. According to Baert (1987), *M. desenderi* is found in large numbers in arid ecological zones on all islands. Although some mature specimens have been collected in November and August, most specimens are found between January and June (Fig. 307), corresponding to the "warm and wet" season in the Galapagos (van der Werff, 1978). The size of mature *M. desenderi* specimens appears to correlate with the collection date: female spiders taken in August are, on average, 80% larger than those taken in November (Fig. 14). This trend may indicate that *M. desenderi* can vary the number of instars before maturity. Alternatively, the intermolt growth may be greater for spiders with their antepenultimate or penultimate instars occurring during the warmer and wetter season.

Distribution. Endemic to the Galapagos Islands (Map 1).

Records Examined. ECUADOR Galapagos: Albemarle, Tagus Cove, 0°16'S 91°22'W, 23.i.1899 (AMNH), 8.ii.1899 (AMNH), 21.iii.1899 (AMNH), 23.iii.1899 (AMNH); Archipiélago de Galapagos, 0°0'N, 90°30'W (Williams Exped., 1923, MCZ); Bahía Conway, Indefatigable Island, 0°33'S, 90°32'W, 17.iii.1935 (Exline-Peck, CAS); Barrington Island, 0°49'S, 90°4'W, 1.viii.1929 (H. H. Cleaves, CAS); Campion, nr. Floreana (Santa María), 1°15'S, 90°27'W, 1.vi.1981 (Y. Lubin, MCZ); Charles Island, 1°17'S, 90°26'W, 10.v.1899 (AMNH); Indefatigable Island, 0°38'S, 90°23'W, 27.iv.1899 (AMNH), 18.vi.1929 (Pinchot South Sea Exp, USNM); Isla Abingdon, 0°35'N, 90°44'W, 25.vi.1899 (AMNH); Isla Albemarle, 0°30'S, 91°4'W, 13.i.1899 (AMNH), 20.ii.1899 (AMNH), 20.iii.1899 (AMNH); Isla Binidloe, 0°19'N, 90°29'W, 20.vi.1899 (AMNH); Isla Hood, 1°23'S, 89°39'W, 18.v.1899 (AMNH), 26.v.1899 (AMNH); Isla Pinta, S Coast, 0°35'N, 90°44'W, 25.v.1964 (D. Q. Cavagnaro, CAS); Isla Plaza, 0°35'S, 90°9'W, 7.iii.1970 (R. Silberglied, MCZ), 26.xi.1973 (Y. Lubin, MCZ); Isla Santa Cruz, Academy Bay, 0°44'30'S, 90°17'30'W, 13.iii.1970 (R. Silberglied, MCZ); Isla Santa Cruz, E slope, 0°38'S, 90°23'W, 16.iv.1964 (D. Q. Cavagnaro, CAS); Isla Santa Cruz, Estacion Cientifica Charles Darwin, 0°44'S, 90°18'W, 24.i.1964 (D. Q. Cavagnaro & R. O. Schuster, CAS), 12.ii.1964 (Cavagnaro & Schuster, CAS), 3.xi.1973 (Y. Lubin, MCZ), 24.xi.1973 (Y. Lubin, MCZ), 25.xi.1973 (Y. Lubin, MCZ); Isla Santa Fe, S coast, 0°50'S, 90°4'W, 30.i.1983 (Y. Lubin, MCZ); James, 0°16'S, 90°42'W, 22.iv.1899 (AMNH);

Narborough Island, 0°25'S, 91°30'W, 28.iii.1899 (AMNH); Sombrero Chino, Rocas Bainbridge, SE of Santiago, 0°21'S, 90°34'W, 31.iii.1970 (R. Silberglied, MCZ); Tower Island, Darwin's Bay [?], 0°17'N, 89°59'W (AMNH); Tower Islands, 0°20'N, 89°58'W, 7.iv.1925 (N.Y. Zoological Society, AMNH); W coast of Albemarle Island, 0°11'N, 91°21'W, 9.iii.1935 (AMNH).

3. *Metepeira grandiosa grandiosa*

Chamberlin & Ivie

Figures 22–28, 321; Map 2

Metepeira grandiosa Chamberlin and Ivie, 1941: 17, figs. 24–26, ♀. Female holotype from Ben Lomond, California, USA in the AMNH, examined.

Metepeira palomara Chamberlin and Ivie, 1942: 72, figs. 200–204, ♀, ♂. Female holotype and paratypes from Mt. Palomar, California, in the AMNH, examined. First synonymized by Levi, 1977: 214.

Metepeira grandiosa grandiosa:—Levi, 1977: 214, figs. 112–116, ♀, ♂.

Note. Levi (1977) opted to collapse *M. palustris*, *M. grandiosa*, *M. alpina*, *M. dakota*, and *M. palomara* into three subspecies of *M. grandiosa*, with the caveat that more data may show the three subspecies to be distinct species. D. Buckle (personal communication) claims that his own recent observations suggest that *M. grandiosa alpina* and *M. grandiosa palustris* are separate species. However, since the bulk of *M. grandiosa* specimens are outside of the geographic range of this revision, and in the absence of molecular data, I will follow Levi's (1977) recommendation and leave these as separate subspecies.

Description. Female from Los Angeles, California, USA. Carapace light around eyes with median white line extending to thoracic furrow (Fig. 27). Legs ringed. Femur I with row of three to four macrosetae on anterior; one on anteroventral. Dorsum with usual folium, though lighter and more speckled than in most species (Fig. 27). Venter with a wide longitudinal white line. Pair of white spots on either side of spiracle (Fig. 28). Sternum entirely black (Fig. 28). Ratio of eye diameters: posterior medians and anterior medians 1.0, anterior laterals 1.2, posterior laterals 1. Anterior median eyes separated by 1.9 diameters, posterior median eyes by 1.3, anterior median eyes separated from anterior laterals by 3 diameters of anterior lateral eyes, lateral eyes separated by 0.4 their diameters. Total length 6.5 mm. Carapace 3.2 mm

long, 2.3 wide. First femur 3.5 mm, patella and tibia 3.7, metatarsus 3.2, tarsus 1.1. Second patella and tibia 3.2 mm, third 1.9, fourth 2.8.

Male from Parque Nacional Sierra San Pedro Martir, Baja California Norte, Mexico. Carapace as in female. Legs lightly ringed. Macrosetae on femur I variable—usually row of four macrosetae on anterior side, five on anteroventral side. Dorsum as in female (Fig. 25). Venter and sternum as in female (Fig. 26). Ratio of eye diameters: posterior medians and anterior medians 1.1, anterior laterals 1.5, posterior laterals 1.5. Anterior median eyes separated by 1.7 diameters, posterior median eyes by 0.8, anterior median eyes separated from anterior laterals by 2.1 diameters of anterior lateral eyes, lateral eyes separated by 0.3 their diameters. Total length 3.6 mm. Carapace 1.9 mm long, 1.5 wide. First femur 2.9 mm, patella and tibia 2.8, metatarsus 2.5, tarsus 0.9. Second patella and tibia 2.3 mm, third 1.3, fourth 1.9.

Diagnosis. The epigynal scape of *M. grandiosa grandiosa* is shorter and stubbier than in other members of the *M. foxi* species group (compare Fig. 24 with Figs. 9, 17, 31). Unlike *M. datona* and *M. desenderi* (Figs. 7, 15), the corkscrew embolus is tilted up with a heavy ridge (Fig. 22), but unlike *M. grandiosa alpina* (Fig. 29), it is more graceful and not as sharply bent. The posteroventral edge of the keel on the median apophysis in *M. grandiosa grandiosa* is not as pointed (Fig. 22) as in *M. grandiosa alpina* (Fig. 29) but not curved as in *M. datona* and *M. desenderi* (Figs. 7, 15).

Variation. Body length of females varies from 5.4 to 8.5 mm; males from 3.5 to 5.1 mm (Levi, 1977).

Natural History. Mature specimens have been collected from March to September (Fig. 321; Levi, 1977) in yellow pine forests and on *Eriogonum fasciculatum* bushes. Elevations range from sea level to 2,000 m.

Distribution. Coastal mountainous re-

gions from British Columbia to Baja California Norte (Levi, 1977, map 2; Map 2).

Records Examined. MEXICO *Baja California Norte*: Parque Nacional Sierra San Pedro Mártir, 30°45'N, 115°13'W, 1.vii.1977 (C. E. Griswold, CAS). USA *Arizona*: Sycamore Canyon [?] Santa Cruz Co, 31°28'N, 110°42'W, 9.ix.1978 (G. F. Knowlton, MCZ). *California*: Los Angeles, 34°3'N, 118°15'W (Davidson, MCZ); Winchester, Double Butte, 33°42'N, 117°5'W, 20.iv.1974 (W. Icenogle, MCZ).

4. *Metepeira grandiosa alpina* Chamberlin and Ivie

Figures 29–35, 325; Map 2

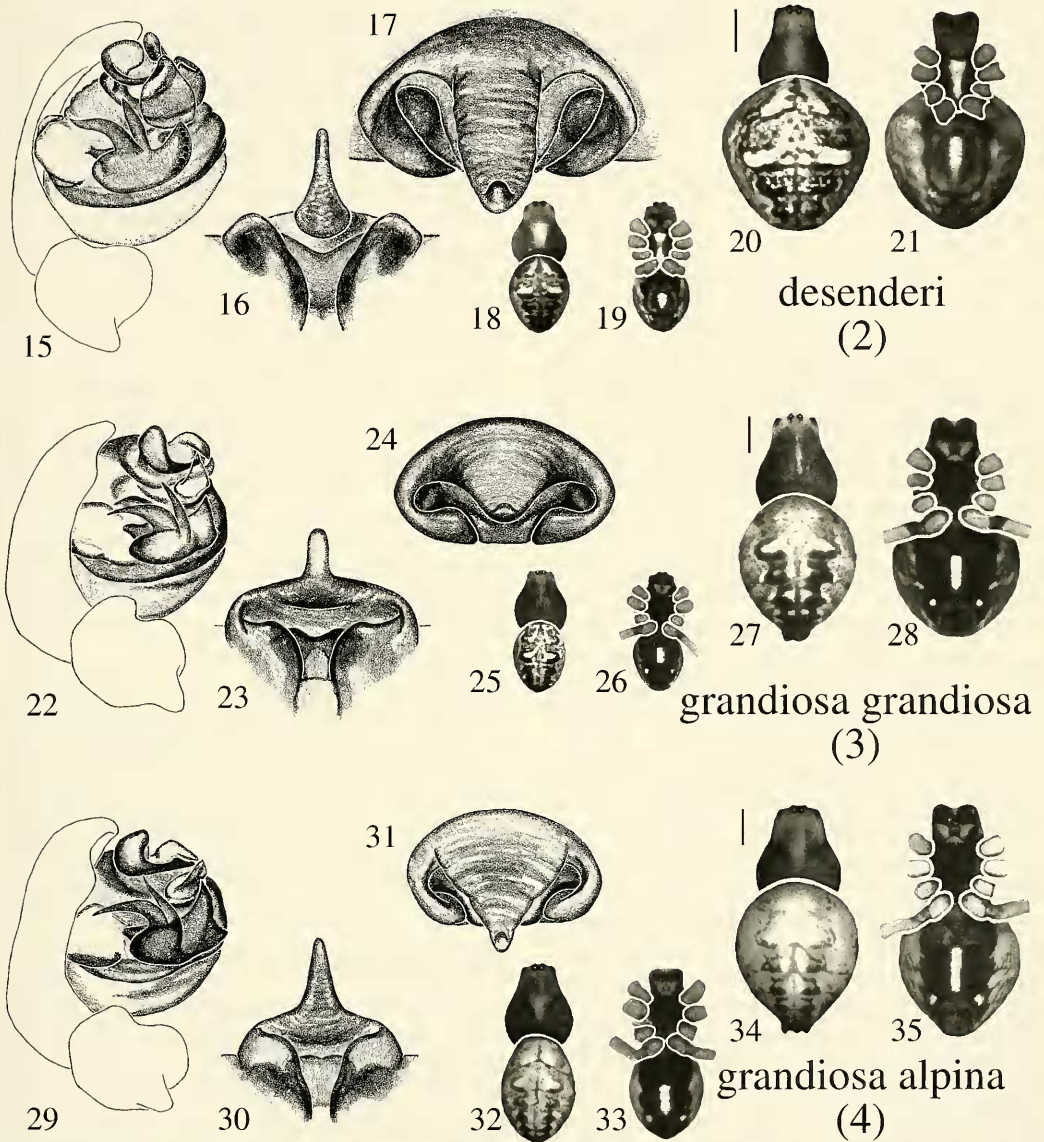
Metepeira dakota Chamberlin and Ivie, 1942: 73, figs. 205–207, ♀, ♂. Male holotype and female paratype from Noonan, North Dakota, USA, in the AMNH, examined. Name synonymized by Levi, 1977: 212–214.

Metepeira alpina Chamberlin and Ivie, 1942: 74. Female holotype and female paratypes from Fish Lake, Utah, USA, in the AMNH, examined.

Metepeira grandiosa alpina:—Levi, 1977: 212–214, figs. 99, 100, 106–111, ♀, ♂. Brignoli, 1983: 276.

Note. As first revisor, Levi (1977) chose to use the name *M. alpina* because its type specimen was collected closer to the center of the subspecies distribution.

Description. Female from Charcas, San Luis Potosí, Mexico. Carapace light around eyes with lateral posterior extensions and median white line extending to thoracic furrow (Fig. 34). Legs lightly ringed. Femur I with row of four macrosetae on anterior side; one on anteroventral side. Dorsum with usual folium, though lighter than in most species (Fig. 34). Venter with a wide longitudinal white line. Pair of white spots on either side of spiracle (Fig. 35). Sternum entirely black (Fig. 35). Ratio of eye diameters: posterior medians and anterior medians 1.0, anterior laterals 1.1, posterior laterals 1.1. Anterior median eyes separated by 1.7 diameters, posterior median eyes by 0.7, anterior median eyes separated from anterior laterals by 2.8 diameters of anterior lateral eyes, lateral eyes separated by 1.1 their diameters. Total length 6.7 mm. Carapace 3 mm long, 2.4 wide. First femur 3.5 mm, patella and tibia 3.8, metatarsus 3.4, tarsus 1.2.



Figures 15–21. *Metepeira desenderi* Baert (sp. 2; 0°38'S, 90°23'W). 15, male palpus, mesal. 16, epigynum, posterior. 17, epigynum, ventral. 18, male, dorsal. 19, male, ventral. 20, female, dorsal. 21, female, ventral.
 Figures 22–28. *Metepeira grandiosa grandiosa* Chamberlin and Ivie (sp. 3 [22, 25, 26] 30°45'N, 115°13'W; [23, 24, 27, 28] 34°3'N, 118°15'W). 22, male palpus, mesal. 23, epigynum, posterior. 24, epigynum, ventral. 25, male, dorsal. 26, male, ventral. 27, female, dorsal. 28, female, ventral.
 Figures 29–35. *Metepeira grandiosa alpina* Chamberlin and Ivie (sp. 4 [29,32,33] 25°56'N, 105°22'W; [30,31,34,35] 23°8'N, 101°7'W). 29, male palpus, mesal. 30, epigynum, posterior. 31, epigynum, ventral. 32, male, dorsal. 33, male, ventral. 34, female, dorsal. 35, female, ventral.

Scale bars: dorsum and venter figures 1.0 mm.

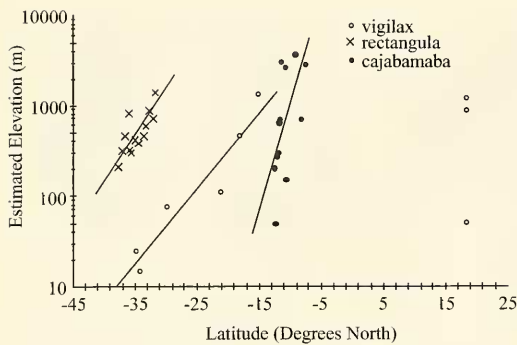


Figure 36. The elevation of collection localities for *M. vigilax*, *M. rectangula*, and *M. cajabamba* at their corresponding latitudes. Species-specific altitudes appear to decrease with distance from the equator. Elevations estimated from NOAA database of 5- by 5-minute geographic tiles. Regression line of *M. vigilax* does not include data points north of the equator. Symbols: *M. vigilax* (○), *M. rectangula* [✕], *M. cajabamba* [●].

Second patella and tibia 3.3 mm, third 1.9, fourth 2.9.

Male from Santa María del Oro, Durango, Mexico. Carapace yellowish brown, light around eyes. Median white triangular mark anterior to thoracic furrow (Fig. 32). Legs same color as carapace. Macrosetae on femur I variable—usually row of four macrosetae on anterior side, five to six on anteroventral side. Dorsum, venter, and sternum as in female (Figs. 32, 33). Ratio of eye diameters: posterior medians and anterior medians 1.0, anterior laterals 1.4, posterior laterals 1.2. Anterior median eyes separated by 1.5 diameters, posterior median eyes by 0.8, anterior median eyes separated from anterior laterals by 2.3 diameters of anterior lateral eyes, lateral eyes separated by 0.3 their diameters. Total length 5.2 mm. Carapace 2.5 mm long, 2 wide. First femur 4.5 mm, patella and tibia 4.6, metatarsus 4.5, tarsus 1.3. Second patella and tibia 3.6 mm, third 1.8, fourth 2.8.

Diagnosis. The epigynal scape of *M. grandiosa alpina* has the widest base of all members of the *M. foxi* species group, and the lobes surrounding the central depression are somewhat fatter (compare Fig. 31 with Figs. 9, 17, 24.). Unlike *M. datona* and *M. desenderi* (Figs. 7, 15), the cork-

screw embolus is tilted up with a heavy ridge (Fig. 29), but unlike *M. grandiosa grandiosa* (Fig. 22), it is thicker and with a sharper L-shape bend instead of a more curved L-shape. The posteroventral edge of the keel on the median apophysis in *M. grandiosa alpina* is pointier (Fig. 29) than in *M. grandiosa grandiosa* (Fig. 22) and not curved as in *M. datona* and *M. desenderi* (Figs. 7, 15).

Variation. Body length of females varies from 4.0 to 6.8 mm; males from 3.1 to 5.3 mm (Levi, 1977).

Natural History. According to Levi (1977), mature specimens have been collected from June to August in meadows of bunchgrass, browsed aspen, oak, juniper, and sagebrush (Fig. 325). Elevations are at around 2,000 m.

Distribution. North American Rockies from southern Alberta and Saskatchewan to Central Mexico (Levi, 1977, map 2; Map 2).

Records Examined. MEXICO Durango: Santa María del Oro, 25°56'N, 105°22'W, 28.vii.1947 (W. J. Gertsch, AMNH). San Luis Potosí: Charcas, mountain side, 23°8'N, 101°7'W, 7.vii.1934 (MCZ). USA. Colorado: Cimarron, 38°27'N, 107°33'W, 21.vii.1959 (H. W. & L. Levi, MCZ); Hayden Creek, Sangre de Cristo Mtns., 38°25'N, 105°35'W [?], 11.vii.1961 (H. W. & L. Levi, MCZ). Utah: SE shore of Bear Lake, 41°59'N, 111°20'W, 3.vii.1978 (G. F. Knowlton, MCZ).

Metepeira vigilax Group

Spiders in the *M. vigilax* group (*Metepeira cajabamba*, *Metepeira glomerabilis*, *Metepeira vigilax*, *Metepeira rectangula*) are characterized by large, sclerotized epigynal openings, not unlike a snail's shell (Figs. 40, 48, 55, 62), and long, robust, emboli with large scooplike basal embolic apophyses (Figs. 38, 46, 53, 60).

5. *Metepeira cajabamba* new species

Figures 36, 38–45, 315; Map 3

Holotype. Male from Cajabamba, Cajamarca, Peru, 25.ix.1955, W Weyrauch, in CAS. The specific name is a noun in apposition after the locality.

Description. Female paratype from Cajabamba, Cajamarca, Peru. Carapace dark

brown, light around eyes with lateral posterior extensions (Fig. 43). Proximal two-thirds of femora white, remainder dark brown. Remaining articles lightly annulated. Femur I with row of three macrosetae on anterior side; none on anteroventral side. Dorsal folium dark; white fleur-de-lis pattern reduced with thin branches (Fig. 43). Venter of abdomen black with wide white median line. Pair of small white spots on either side of colulus (Fig. 44). Sometimes the posterior end of median line ends in anchor shape (Fig. 45). Sternum black, sometimes with (Fig. 44) or without (Fig. 45) median white line. Ratio of eye diameters: posterior medians and anterior medians 1.1, anterior laterals 1.4, posterior laterals 1.2. Anterior median eyes separated by 1.6 diameters, posterior median eyes by 0.9, anterior median eyes separated from anterior laterals by 3 diameters of anterior lateral eyes, lateral eyes separated by 0.2 their diameters. Total length 6.4 mm. Carapace 3 mm long, 2.3 wide. First femur 3.3 mm, patella and tibia 3.5, metatarsus 2.9, tarsus 0.9. Second patella and tibia 2.9 mm, third 1.7, fourth 2.7.

Male holotype. Carapace dark brown, white around eyes with lateral posterior extensions and median white mark (Fig. 41). Proximal third of femora white, remainder dark brown. Remaining articles lightly annulated. Femur I with row of three macrosetae on anterior side; one on anteroventral side. Dorsal folium dark; white fleur-de-lis pattern indistinct with thin and broken branches (Fig. 41). Venter of abdomen black with median white mark. Pair of small white spots on either side of spiracle and colulus (Fig. 42). Sternum black, often with median white line (Fig. 42). Ratio of eye diameters: posterior medians and anterior medians 1.0, anterior laterals 1.3, posterior laterals 1. Anterior median eyes separated by 1.5 diameters, posterior median eyes by 0.9, anterior median eyes separated from anterior laterals by 2.3 diameters of anterior lateral eyes, lateral eyes separated by 0.3 their diame-

ters. Total length 4 mm. Carapace 1.9 mm long, 1.5 wide. First femur 3 mm, patella and tibia 3, metatarsus 2.7, tarsus 0.9. Second patella and tibia 2.4 mm, third 1.2, fourth 1.8.

Diagnosis. Female *M. cajabamba* and *M. glomerabilis* differ from the other species in the *M. vigilax* group (*M. vigilax* and *M. rectangula*) by the smaller and more tubelike openings to the epigynum (compare Figs. 40, 48 with Figs. 55, 62). Female *M. cajabamba* differs from *M. glomerabilis* by having epigynal openings that are more oval (Fig. 40) than round (Fig. 48) when viewed ventrally, having the epigynal openings farther apart (compare Fig. 40 with Fig. 48), and by having the sclerotized tubelike openings more anteriorly directed (Fig. 40) than parallel to the epigynal groove (Fig. 48). Male *M. cajabamba* and *M. glomerabilis* differ from other species in the *M. vigilax* group by the smaller, thinner, and more graceful emboli (compare Figs. 38, 46 with Figs. 53, 60). *Metopeira cajabamba* differs from *M. glomerabilis* by lacking a keel on the median apophysis, an only slightly fatter embolus, and having a normal embolus cap, in contrast to a winged embolus cap (Fig. 46). A larger portion of the prosoma is dark in *M. cajabamba* (Fig. 43) as compared to *M. glomerabilis* (Fig. 51).

Variation. Average body length of nine females examined 6.2 mm, range 5.4 to 7.5 mm. Average body length of four males examined 4 mm, range 3.7 to 4.9 mm.

Natural History. With the exception of two specimens, mature *M. cajabamba* specimens have been collected in May through October (Fig. 315). Altitudes of collection localities appear to correlate steeply with latitude (Fig. 36). Median elevation, about 500 m, with a range from near sea level to 3,500 m.

Distribution. Ecuador and Peru (Map 3).

Records Examined. PERU *Ancash*: Callejon de Huaylas, 9°10'S, 77°45'W, 15.viii.1988 (V. and B. Roth, CAS). *Cajamarca*: Cajabamba, 12.427, 7°37'S, 78°3'W, 25.ix.1955 (W. Weyrauch, CAS). *La Libertad*:

Cerro Campana, La Cumbre, 8°1'S, 79°5'W, 10.x.1966 (A. F. Archer, AMNH). Lima: 20 km E Ancón, 11°47'S, 76°59'W, 1.xi.1953 (W. Weyrauch, CAS); 23 mi N Pativilca, 10°42'S, 77°47'W, 15.i.1955 (E. I. Schlinger and E. S. Ross, CAS); 5 km NW Chilca, 12°29'S, 76°48'W, 12.ix.1954 (E. I. Schlinger and E. S. Ross, CAS); between mouths of Río Chillon and Ancon [?], 11°54'S, 77°7'W, 5.viii.1953 (M. Koepcke and Koepcke, MUSM); Cajacay [?], Río Fortaleza, 10°40'S, 77°52'W, 6.iii.1956 (W. Weyrauch, CAS); Canta, Río Chillón, 11°28'12"S, 76°37'23"W, 12.v.1951 (W. Weyrauch, CAS); Cerro Caracoles, 12°23'S, 76°45'W, 15.ix.1951 (W. Weyrauch, CAS); Lima, 12°3'S, 77°3'W (K. Jelski and Stolzman, PAN); Lomas de Iguanil [?] (Huaral), 11°29'51"S, 77°12'12"W, 14.vi.1986 (D. Silva, MUSM).

6. *Metepeira glomerabilis* (Keyserling)

Figures 37, 46–52, 314; Map 3

Epeira glomerabilis Keyserling, 1892: 154, fig. 113, ♀, ♂. Male and female syntypes from Taquara, Rio Grande do Sul and Serra Vermelha, Rio de Janeiro, Brazil, in BMNH, examined. Male here designated lectotype.

Araneus glomerabilis:—Petrunkевич, 1911: 294. Roewer, 1942: 843.

Aranea santa Chamberlin, 1916: 254, pl. 19, fig. 10, ♀. Female holotype from Santa Ana, 3,000 m, Cuzco, Peru, in MCZ, examined. NEW SYNONYMY. *Metepeira santa*:—Chamberlin and Ivie, 1942: 67. Platnick, 1993: 449.

Metepeira glomerabilis:—Chamberlin and Ivie, 1942: 68, fig. 181.

Metazygia glomerabilis:—Levi, 1991: 179. Platnick, 1993: 448. Erroneous transfer.

Description. Female from Puñapí, Tungurahua, Ecuador. Carapace brown; white arrowhead mark between eye region and thoracic furrow (Fig. 51). Legs dusky brown, lighter on ventral surfaces of femora I and II; lighter on dorsal surfaces of patellae, tibiae, and metatarsi I and II. Femur I with row of two to three macrosetae on anterior side; none on anteroventral side. Dorsal folium dark, speckled white, and white fleur-de-lis pattern with thin branches (Fig. 51). Venter black with short, wide, white median line ending in a T-shape; pair of small white spots on either side of spiracle (Fig. 52). Sternum black with median white line widening anteriorly (Fig. 52). Ratio of eye diameters: posterior medians and anterior medians 1.0, anterior laterals 1.3, posterior laterals 1.2. Anterior median eyes separated by 1.3 diameters,

posterior median eyes by 0.9, anterior median eyes separated from anterior laterals by 1.7 diameters of anterior lateral eyes, lateral eyes separated by 0.2 their diameters. Total length 5 mm. Carapace 2.4 mm long, 1.7 wide. First femur 2.2 mm, patella and tibia 2.3, metatarsus 1.9, tarsus 0.9. Second patella and tibia 1.9 mm, third 1.2, fourth 1.8.

Male from Puñapí, Tungurahua, Ecuador. Carapace as in female, except for a greater separation between white coloration around eyes and arrowhead mark (Fig. 49). Legs light tan, dark distally on femora. Femur I with row of three macrosetae on anterior side; four on anteroventral side. Dorsal folium and venter as in female (Figs. 49, 50). Sternum black with partly broken median white line widening anteriorly (Fig. 50). Ratio of eye diameters: posterior medians and anterior medians 1.1, anterior laterals 1.3, posterior laterals 1.2. Anterior median eyes separated by 1.8 diameters, posterior median eyes by 1.2, anterior median eyes separated from anterior laterals by 2 diameters of anterior lateral eyes, lateral eyes separated by 0.3 their diameters. Total length 3.5 mm. Carapace 1.7 mm long, 1.4 wide. First femur 2.5 mm, patella and tibia 2.4, metatarsus 2.3, tarsus 0.9. Second patella and tibia 1.9 mm, third 1.0, fourth 1.7.

Diagnosis. Female *M. glomerabilis* and *M. cajabamba* differ from the other species in the *M. vigilax* group (*M. vigilax* and *M. rectangula*) by the smaller and more tubelike openings to the epigynum (compare Figs. 40, 48 with Figs. 55, 62). *Metepeira glomerabilis* differs from *M. cajabamba* by having epigynal openings that are more round (Fig. 48) than oval (Fig. 40) when viewed ventrally, having the epigynal openings closer together (compare Fig. 48 with Fig. 40), and by having the sclerotized tubelike openings more parallel to the epigynal groove (Fig. 48) than anteriorly directed (Fig. 40). Male *M. glomerabilis* and *M. cajabamba* differ from other species in the *M. vigilax* group by the smaller, thinner, and more graceful emboli

(compare Figs. 38, 46 with Figs. 53, 60). *Metepeira glomerabilis* differs from *M. cajabamba* by having a keel on the median apophysis, an only slightly slimmer embolus, and a larger, winged embolus cap (compare Fig. 46 with Fig. 38). A larger portion of the prosoma is white in *M. glomerabilis* (Fig. 51), compared to *M. cajabamba* (Fig. 43). In addition, the margins of the folium, particularly in the male, are whiter than in other species in the group (compare Fig. 49 and Keyserling [1892, fig. 113b] with Figs. 41, 56, 63).

Variation. Average body length of 28 females examined 5.1 mm, range 3.8 to 7.3 mm. Average body length of 10 males examined 3.1 mm, range 2.4 to 4.3 mm. The base of the embolus varies from relatively thin (Fig. 46) to somewhat thicker, as in *M. cajabamba* (Fig. 38).

Natural History. At first it would appear that this species is not seasonal—mature specimens have been collected throughout the year (Fig. 315). However on closer inspection, there seems to be a seasonal shift with elevation: mature spiders are found at low altitudes (0–500 m) between March and October, at medium altitudes (500–1,500 m) between August and March, and at high altitudes (1,500–4,000 m) between December and June (Fig. 37). In coastal regions, R. Baptista (personal communication) reports that this species forms small aggregations of two to 10 spiders.

Distribution. Colombia, Ecuador, Peru, Bolivia, Paraguay, and southern Brazil (Map 3). Elevations range from sea level to 4,000 m.

Records Examined. BOLIVIA *Chuquisaca*: Montegudo, 19°49'S, 63°59'W, 24.xii.1984 (L. E. Peña, AMNH). BRAZIL *Espírito Santo*: Fazenda Santa Maria [?], Apiaca, 21°4'S, 41°25'W, 22.ix.1985 (R. L. C. Baptista, MZSP). *Mato Grosso*: Chavantina, 14°40'S, 52°21'W, 15.vi.1947 (J. C. Carvalho, MNRJ); Fazenda Cervo, Três Lagoas, 20°48'S, 51°43'W, 18.ix.1964 (Exp. Depto. Zool., MZSP); Utiariti, 13°2'S, 58°17'W, 15.viii.1961 (Lenks, MZSP). *Minas Gerais*: Lavras, 21°14'S, 45°0'W, 20.x.1978 (W. Don Fronk, MCZ); Pedra Azul, 16°1'S, 41°16'W, 15.xii.1970 (F. M. Oliveira, AMNH); Peti Forest Res. [?], Santa Bárbara, on bushes in cerrado, 19°56'S, 43°24'W, 28.viii.1986 (R. L. C. Baptista, MZSP). Pa-

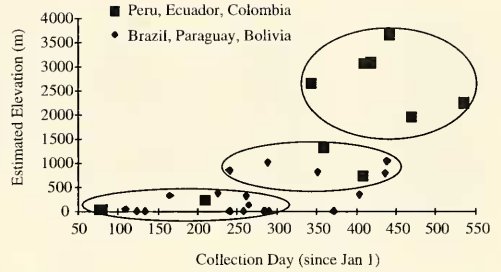


Figure 37. The elevation of collection localities for mature spiders of *M. glomerabilis* on specific days of the year between 1939 and 1990. There appears to be a shift in seasonal maturation times that corresponds better with elevation than with latitude. Elevations estimated from NOAA database of 5- by 5-minute geographic tiles.

Scale of abscissa: 100 = April 9; 300 = October 27; 500 = May 15 of the following year.

Symbols: Peru, Ecuador, Colombia [■]; Brazil, Paraguay, Bolivia [◆].

raná: Praia do Leste, Paranaguá, 25°46'S, 48°31'W, 4.v.1967 (P. Biasi, MZSP). *Rio de Janeiro*: Guaratiba, 22°58'S, 42°48'W, 28.viii.1976 (J. A. P. Dutra, MZSP); Ilha de Santana, Macaé, 22°25'S, 41°44'W, 18.x.1986 (R. L. C. Baptista, MZSP); Itaipu, Niterói, 22°56'S, 43°5'W, 20.iv.1985 (R. L. C. Baptista, MZSP). *Rio Grande do Norte*: Fazenda Canaan [?], Macaíba, 5°51'S, 35°21'W, 15.ix.1951 (M. Alvorenga, MZSP). *Rondônia*: Vila Rondônia, 10°52'S, 61°57'W, 9.ii.1961 (Pereira & Machado, MZSP). *Santa Catarina*: Nova Teutonia, 27°3'S, 52°24'W, 12.v.1949 (SMF). *São Paulo*: Barueri, 23°31'S, 46°53'W, 13.iii.1966 (K. Lenko, MZSP); Campos do Jordão, 22°44'S, 45°35'W, 15.iii.1945 (Wygod, MZSP); Instituto Oceanográfico, Ubatuba, 23°26'S, 45°4'W, 15.v.1967 (P. Montouchat, MZSP); km 1 Rod, Rio Santos [?], Ubatuba, 23°26'S, 45°4'W, 12.x.1985 (R. L. C. Baptista, MZSP), 13.x.1985 (R. L. C. Baptista, MZSP); km 3 Rod, Rio Santos [?], Ubatuba, 23°26'S, 45°4'W, 6.i.1985 (R. L. C. Baptista, MZSP). COLOMBIA *Cundinamarca*: Sabana de Bogotá, 4°43'N, 74°10'W, 10.xii.1990 (C. Valderrama, CV). ECUADOR *Guayas*: Guayaquil, 2°10'S, 79°54'W, 18.iii.1942 (H. E. F. & D. E. F. CAS), 22.iii.1942 (Landis, CAS). *Pichincha*: 15 mi N Quito, 0°0'N, 78°30'W, 23.ii.1955 (E. I. Schlinger & E. S. Ross, CAS). *Tungurahua*: Baños, 1°24'S, 78°25'W, 15.iv.1939 (W. C. Macintyre, MCZ); Puñapí, 1°22'S, 78°28'W, 19.vi.1943 (D. L. F. & H. E. F. CAS). PARAGUAY *Alto Paraná*: Taguara, 25°30'S, 54°50'W (AMNH). *Caazapa*: Villa Pastore, 25°53'S, 55°45'W (D. Wees, MCZ). PERU *Cajamarca*: Cajamarca, 7°10'S, 78°31'W, 15.ii.1942 (W. Weyrauch, AMNH). *Lambayeque*: 10 km S Chiclayo, 7°59'S, 77°17'W, 19.iii.1951 (E. S. Ross & Michelbacher, CAS). *Piura*: Cerro Prieto, La Brea, 4°41'S, 81°6'W (CAS); Higuera (Las Lomas) [?], 4°19'S, 80°26'W, 29.vii.1941 (D. L. F. & H. E. F. CAS). VENEZUELA *Sucre*: 1 km S Villa Frontado, Rd. to

Caripe, 10°27'N, 63°37'W, 12.ii.1984 (J. Coddington, USNM).

7. *Metepeira vigilax* (Keyserling)

Figures 36, 53–59, 327; Map 4

Epeira vigilax Keyserling, 1893: 211, fig. 156, ♂. Male holotype from Taquara, Rio Grande do Sul, Brazil, in BMNH, examined.

Araneus vigilax:—Petrunkevitch, 1911: 324. Roewer, 1942: 856.

Metepeira dominicana Archer, 1965: 132, figs. 12, 18, ♀. Female holotype from west of Baní, Dominican Republic, in AMNH. Holotype lost. Brignoli, 1983: 275. NEW SYNONYMY.

Metepeira vigilax:—Levi, 1991: 180. Platnick, 1993: 449.

Note. Although the type for *M. dominicana* is lost, the name has been identified by using Archer's (1965) description and illustration.

Description. Female from Trujillo, west of Baní, Dominican Republic. Carapace light around eyes with lateral posterior extensions (Fig. 58). Legs dark, light rings on proximal ends of leg articles. Femur I with row of four macrosetae on anterior side; three on anteroventral side. Dorsal folium darker than in most species; fleur-de-lis usually reduced to two white spots (Fig. 58). Venter brownish gray with lighter margins. Wide, short, median white line with pair of white spots on either side of spiracle (Fig. 59). Sternum brownish black with wide, white line widening anteriorly (Fig. 59). Ratio of eye diameters: posterior medians and anterior medians 1.2, anterior laterals 1.2, posterior laterals 1.1. Anterior median eyes separated by 1.8 diameters, posterior median eyes by 1.1, anterior median eyes separated from anterior laterals by 3.5 diameters of anterior lateral eyes, lateral eyes separated by 0.1 their diameters. Total length 9.2 mm. Carapace 3.9 mm long, 3.2 wide. First femur 4.1 mm, patella and tibia 4, metatarsus 3.3, tarsus 1.2. Second patella and tibia 3.4 mm, third 2.3, fourth 3.4.

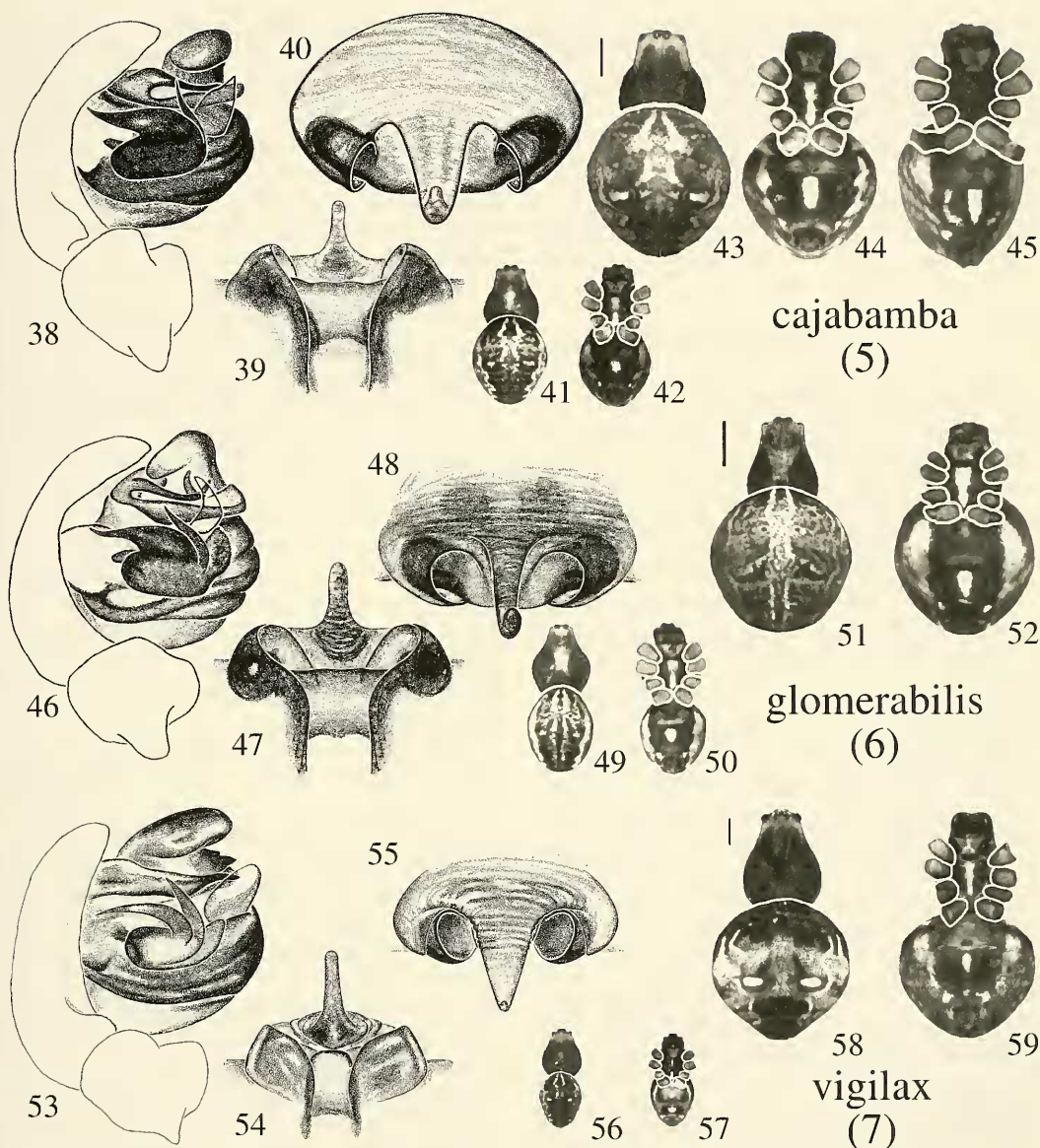
Male from same locality as female. Black carapace with white around eyes and extending posteriorly; white wedge mark in center (Fig. 56). Legs ringed like female. Femur I with row of three macrosetae on anterior side; three on anteroventral

side. Dorsum and venter as in female (Figs. 56, 57). Median white line may be limited to posterior end of sternum (Fig. 57). Ratio of eye diameters: posterior medians and anterior medians 0.9, anterior laterals 1.1, posterior laterals 1. Anterior median eyes separated by 1.6 diameters, posterior median eyes by 1.3, anterior median eyes separated from anterior laterals by 2 diameters of anterior lateral eyes, lateral eyes separated by 0.2 their diameters. Total length 3.9 mm. Carapace 2 mm long, 1.5 wide. First femur 2.6 mm, patella and tibia 2.5, metatarsus 2.4, tarsus 0.9. Second patella and tibia 2.1 mm, third 1.2, fourth 1.7.

Diagnosis. Female *M. vigilax* differ from those of other species in the *M. vigilax* species group by the shape of the epigynal openings: from a ventral view the openings are oval and angled inward posteriorly (Fig. 55); from a posterior view, the edges of the openings are more parallel to the body (Fig. 61) as opposed to more perpendicular to the body (Figs. 39, 61). Male *M. vigilax* differ from other species because the embolus is larger and more robust (compare Fig. 53 with Figs. 38, 46, 60); the two flagella on the median apophysis are of more similar width (compare Fig. 53 with Fig. 38), and the keel on the median apophysis is slim and feather-shaped (Fig. 38), in contrast to arrow-shaped (Figs. 46, 60) or absent (Fig. 38). The dorsal folium differs from other *Metepeira* species by having a wide black median stripe at the posterior end of the abdomen (Fig. 58). In Brazilian and Bolivian specimens this stripe often extends all the way to the black anterior shoulders of the dorsum, forming a wide T-shape mark.

Variation. Specimens from Argentina tend to be more lightly pigmented than those from more northern localities. White markings on the eye region of Brazilian and Bolivian specimens surround only the lateral eyes, in contrast to those on Hispaniolan specimens, which cover the entire eye region.

Natural History. Mature adults have



Figures 38–45. *Metepeira cajabamba* new species (sp. 5 [38–44] 7°37'S, 78°3'W; [45] 9°10'S, 77°45'W). 38, male palpus, mesal. 39, epigynum, posterior. 40, epigynum, ventral. 41, male, dorsal. 42, male, ventral. 43, female, dorsal. 44, female, ventral. 45, female, ventral.

Figures 46–52. *Metepeira glomerabilis* (Keyserling) (sp. 6; 1°22'S, 78°28'W). 46, male palpus, mesal. 47, epigynum, posterior. 48, epigynum, ventral. 49, male, dorsal. 50, male, ventral. 51, female, dorsal. 52, female, ventral.

Figures 53–59. *Metepeira vigilax* (Keyserling) (sp. 7 [53–57] 18°27'N, 72°17'W; [58,59] 18°17'N, 70°22'W). 53, male palpus, mesal. 54, epigynum, posterior. 55, epigynum, ventral. 56, male, dorsal. 57, male, ventral. 58, female, dorsal. 59, female, ventral.

Scale bars: dorsum and venter figures 1.0 mm.

been collected throughout the year except January, February, and March (Fig. 327). Spiders have been found among electric wires four meters above ground. Locality elevations range from near sea level to 1,400 m and follow an ecological zone that decreases in elevation with distance from the equator (Fig. 36). Over equivalent latitudes, *M. vigilax* lives at less than one-tenth of the elevation of *M. rectangula* (Fig. 36).

Distribution. Hispaniola, Bolivia, Brazil, and coastal Argentina (Map 4). The disjunct distribution between Hispaniolan and South American populations may be due to human-assisted migration.

Records Examined. ARGENTINA Buenos Aires: Celsya-Pereyra [?], 34°50'S, 58°6'W (MACN); Zelaya, 34°21'S, 58°52'W (MACN). BOLIVIA La Paz: Apolo, 14°43'S, 68°31'W, 10.viii.1989 (L. E. Peña, AMNH). Santa Cruz: Estación Robore, above creek, 18°20'S, 59°45'W, 27.ix.1955 (Azambuya, CAS). BRAZIL Espírito Santo: Fazenda Santa Maria [?], Apiacá, 21°4'S, 41°25'W, 14.v.1988 (R. L. C. Baptista, MZSP). Rio Grande do Sul: São Leopoldo, 29°46'S, 51°9'W, 14.vi.1964 (Celia Valle, MZSP). DOMINICAN REPUBLIC Azua: El Puerto, Majagual and Peralta, 18°34'N, 70°47'W, 10.xi.1979 (E. Marcano, MNSD). Prov. Trujillo Valdez: W Baní, 18°17'N, 70°22'W, 8.viii.1958 (A. F. Archer & E. de Boyrie Moya, AMNH). HAITI Departement de L'Ouest: Kenscoff, 18°27'N, 72°17'W, 15.xii.1929 (J. C. Myers, AMNH), 17.iv.1935 (AMNH).

8. *Metepeira rectangula* (Nicolet)

Figures 36, 60–66, 306; Map 4

Epeira rectangula Nicolet, 1849: 500, female holotype from Valdivia, Chile, in MNHN.

Metepeira labyrinthea:—Petrunkevitch, 1911: 298. Roewer, 1942: 868. Bonnet, 1957: 2821. Erroneous synonymy.

Metepeira rectangulata:—Chamberlin and Ivie, 1942: 71. Unjustified emendation.

Note. The name was identified using drawings of the holotype (H. W. Levi, personal illustrations).

Description. Female from Angol, Malleco, Chile. Carapace reddish brown with long white setae behind lateral eyes. Anterior third of carapace white, median white line reaching thoracic furrow (Fig. 65). Proximal halves of femora white, remainder black with distal white marks on dorsal surfaces. Patellae mostly black, re-

maining articles white with black marks at base of setae. Femur I with row of three to five macrosetae on anterior side; three to four on anteroventral side. Anterior margin of dorsal abdomen black; dorsal folium yellowish with brown speckles, white fleur-de-lis pattern with wide branches (Fig. 65). Venter black with wide white median line, flanked by pair of thin white lines; pair of white spots on either side of spiracle connected by white line (Fig. 66). Sternum black with posterior white mark (Fig. 66). Ratio of eye diameters: posterior medians and anterior medians 1.0, anterior laterals 1.1, posterior laterals 1.1. Anterior median eyes separated by 1.7 diameters, posterior median eyes by 1.0, anterior median eyes separated from anterior laterals by 3.3 diameters of anterior lateral eyes, lateral eyes separated by 0.1 their diameters. Total length 8.4 mm. Carapace 3.7 mm long, 2.9 wide. First femur 4.2 mm, patella and tibia 4.1, metatarsus 3.7, tarsus 1.2. Second patella and tibia 3.4 mm, third 2.1, fourth 3.1.

Male from Angol, Malleco, Chile. Carapace reddish brown, anterior third white, median white line extending to thoracic furrow (Fig. 63). Proximal halves of femora, white, distal halves black. Patellae black, remaining articles white with black spots at base of setae. Femur I with row of six to eight macrosetae on anterior side; seven to 11 on anteroventral side. Dorsal abdomen white, marbled, and speckled brown (Fig. 63). Venter dark brown with wide white median mark, flanked by pair of thin white lines; pair of white spots on either side of spiracle connected by white line (Fig. 64). Sternum dark brown with partly broken median white line (Fig. 64). Ratio of eye diameters: posterior medians and anterior medians 1.0, anterior laterals 1.2, posterior laterals 1.1. Anterior median eyes separated by 1.7 diameters, posterior median eyes by 1.1, anterior median eyes separated from anterior laterals by 2.9 diameters of anterior lateral eyes, lateral eyes separated by 0.2 their diameters. Total length 6.1 mm. Carapace 3.2 mm long,

2.5 wide. First femur 5.2 mm, patella and tibia 5, metatarsus 4.9, tarsus 1.2. Second patella and tibia 4.1 mm, third 2, fourth 3.1.

Diagnosis. Female *M. rectangula* differ from the other species in the *M. vigilax* group (*M. vigilax*, *M. glomerabilis*, *M. cajabamba*) by the shape of the epigynal openings: from a ventral view they are larger, wider, and more gaping than in the other species (compare Fig. 62 with Figs. 40, 48, 55). Males differ from other species in the group by having an embolus that is relatively larger than that of *M. glomerabilis* and *M. cajabamba*, yet smaller than that of *M. vigilax* (compare Fig. 60 with Figs. 38, 46, 53). Among all members of the *M. vigilax* group, the keel on the median apophysis of *M. rectangula* is the largest and most robust, and the dorsal folium has the lightest coloration (Fig. 65).

Variation. Average body length of 11 females examined 8.6 mm, range 5.8 to 10 mm. Average body length of six males examined 6 mm, range 4.1 to 7 mm. Specimens from two localities in western Argentina resemble *M. vigilax*, and may be hybrids.

Natural History. This species appears to follow a narrow ecological zone that decreases in elevation with increasing southern latitude (Fig. 36). Median elevation, about 500 m. Mature specimens have been collected January through April (Fig. 306). Specimens from localities south of the 36th parallel tend to be found in January and February, whereas those north of the 36th parallel tend to be found in March and April.

Distribution. Chilean Andes between 31° and 38° south (Map 4).

Records Examined. ARGENTINA *Córdoba*: Calamuchita, 32°4'S, 64°33'W, 15.iii.1954 (J. M. Viana, MACN). *Mendoza*: Mendoza, 32°53'S, 68°49'W, 30.iii.1965 (H. W. Levi, MCZ). CHILE *Bio-Bío*: 4 km E road to Pinto, 36°42'S, 71°53'W, 4.i.1976 (B. Moreno, AMNH); Road to Pemuco, Cruce del Carmen, 36°56'S, 72°4'W, 10.i.1976 (G. Moreno, AMNH). *Coquimbo*: Illapel: Salamanca: Fundo Tahuinco, 31°44'S, 71°5'W, 30.iv.1946 (R. Doneso, AMNH). *Malleco*: Angol, 37°48'S, 72°43'W (D. S. Bullock,

CAS), 10.iii.1945 (E. A. Chapin, USNM). *Maule*: 10 km S Curico, 35°4'S, 71°14'W, 15.iii.1968 (L. E. Peña, MCZ); Cordillera de Parral [?], 36°9'S, 71°50'W, 25.ii.1956 (L. E. Peña, IRSNB); Linares, 35°51'S, 71°36'W (L. E. Peña, IRSNB); Miraflores, Pedag. [?], 35°55'S, 71°39'W (Toro, AMNH). *O'Higgins*: Fundo Millahue, Cunaco, 34°36'S, 71°16'W, 30.iv.1961 (AMNH). *Región Metropolitana*: Melipilla, 33°42'S, 71°13'W (L. E. Peña, IRSNB). *Valparaíso*: Casablanca, 33°19'S, 71°25'W, 15.ii.1955 (Edwin Reed, AMNH).

Metepeira labyrinthea Group

Levi (1977) described the *M. labyrinthea* group very broadly—it included species with a longitudinal white line down the sternum and a short keel on the median apophysis. Here, this species group is much narrowed to include only three North American species: *Metepeira labyrinthea*, *Metepeira lacandon*, and *Metepeira spinipes*. Males of these three species are unique among *Metepeira* by having a toothless, smooth keel on the median apophysis. In addition, their distal embolic apophysis rises away (anteriorly) from the embolus proper and projects forward (ventrally) until it is almost even with the embolus tip (Figs. 67, 76). In contrast, other *Metepeira* species with distal embolic apophyses have the embolus tip extend far beyond the projection of the apophysis (e.g., Fig. 171). The female epigynum has a characteristic shape. The scape is thick and fleshy and the epigynal openings have membranes that make them look distinctly (Fig. 69) or indistinctly (Fig. 78) almond-shaped. The epigyna of the *M. labyrinthea* species group are easily confused with that of the closely related species, *M. gosoga* (Fig. 173). Although most differences between *M. labyrinthea* group and *M. gosoga* are only obvious in the epigynum, it should be noted that the dark marks inside the epigynal openings of the former appear to look cross-eyed, but this cannot be said for the latter. In this work, only the species collected at localities south of the U.S./Mexico boarder are treated.

9. *Metepeira spinipes*

F. O. P.-Cambridge

Figures 67–75, 335; Map 6

Metepeira spinipes F. O. P.-Cambridge, 1903: 459, figs. 9, 10, ♂, ♀. Male holotype from Mexico City, Mexico, in BMNH, examined. Roewer, 1942: 868.

Epeira labyrinthea grinnelli Coolidge, 1910: 281, ♀. Holotype from Palo Alto, California, lost.

Araneus spinipes:—Petrunkevitch, 1911: 317.

Aranea labyrinthea grinnelli:—Moles, 1921: 42.

Metepeira douglasi Chamberlin and Ivie, 1941: 18, figs. 21–23, ♀. Female holotype from Santa Ana, California, in AMNH, examined. Chamberlin and Ivie, 1942: 66, figs. 169–170. First synonymized with *M. labyrinthea grinnelli* by Levi, 1977: 198.

Metepeira labyrinthea grinnelli:—Roewer, 1942: 868.

Metepeira labyrinthea:—Bonnet, 1957: 2822. Erroneous synonymy.

Metepeira grinnelli:—Levi, 1977: 198, figs. 21–27, ♂, ♀. NEW SYNONYMY.

Description. Female from Huitzilac, Morelos, Mexico. Brown carapace with anterior portion darker reddish brown, white behind lateral eyes (Fig. 74). Legs yellowish, femora reddish brown distally, other articles dark brown distally. Femur I with row of four to five macrosetae on anterior side; two to seven on anteroventral side. Anterior shoulders of abdomen black. Dorsal folium with usual *Metepeira* pattern, though largest branches of white fleur-de-lis shape usually widened into large spots (Fig. 74). Venter of abdomen black with wide white median line (Fig. 75). Pair of small white spots on either side of spiracle. Sternum black with posterior white mark that in some cases extends anteriorly to the labium (Figs. 73, 75). Ratio of eye diameters: posterior medians and anterior medians 1.1, anterior laterals 1.0, posterior laterals 0.9. Anterior median eyes separated by 1.9 diameters, posterior median eyes by 1.3, anterior median eyes separated from anterior laterals by 2.9 diameters of anterior lateral eyes, lateral eyes separated by 0.2 their diameters. Total length 9.2 mm. Carapace 3.7 mm long, 2.9 wide. First femur 4.4 mm, patella and tibia 4.7, metatarsus 4.6, tarsus 1.3. Second patella and tibia 4.1 mm, third 2.4, fourth 3.6.

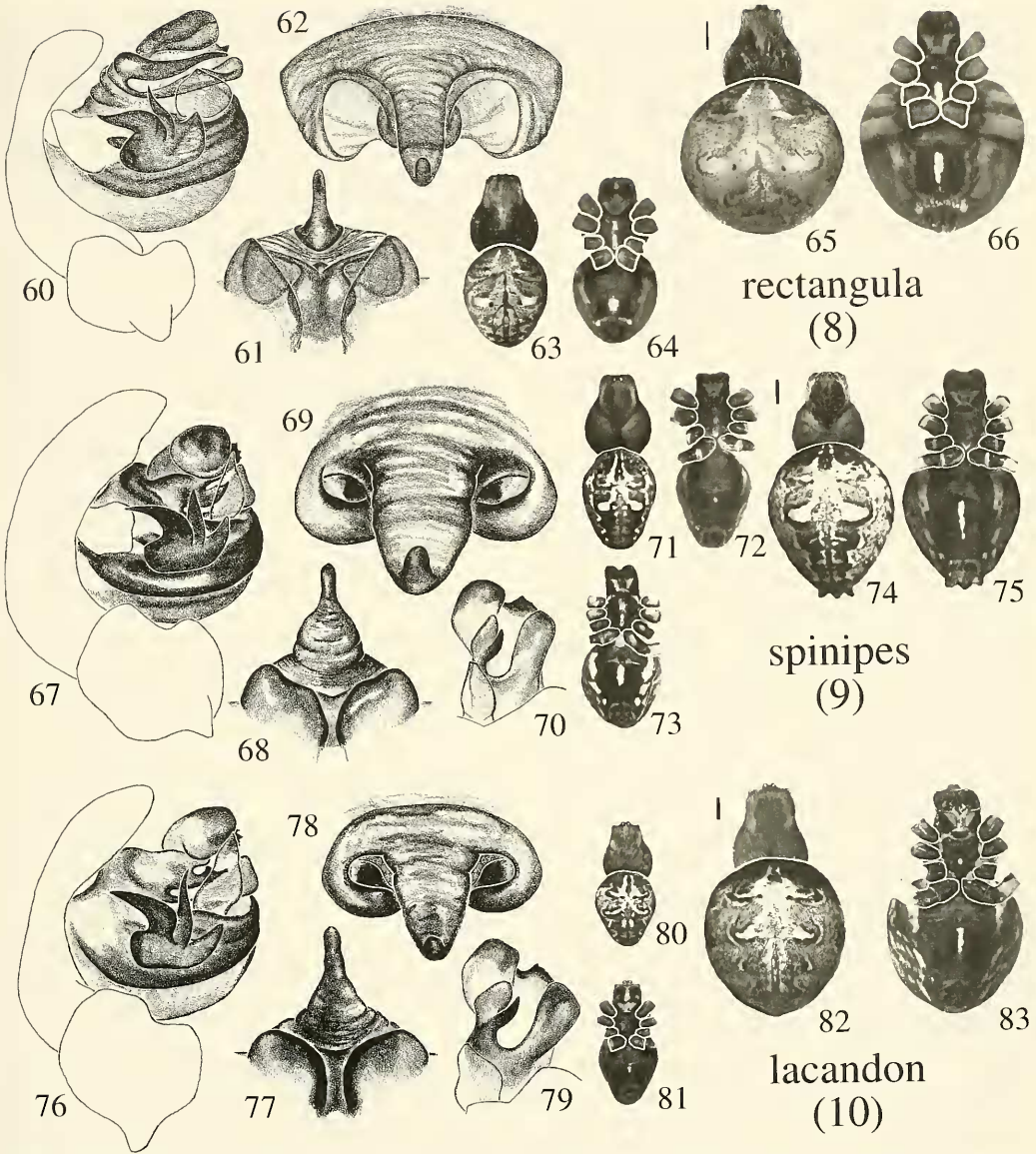
Male from Huitzilac, Morelos, Mexico.

Carapace, dorsum, venter, sternum as in female (Figs. 71, 72). Distal portions of leg articles reddish black, elsewhere yellowish. Femur I with row of four to six macrosetae on anterior side; five to nine on anteroventral side. Ratio of eye diameters: posterior medians and anterior medians 1.1, anterior laterals 1.2, posterior laterals 1.1. Anterior median eyes separated by 1.8 diameters, posterior median eyes by 1.1, anterior median eyes separated from anterior laterals by 3.2 diameters of anterior lateral eyes, lateral eyes separated by 0.3 their diameters. Total length 7.5 mm. Carapace 3.8 mm long, 2.8 wide. First femur 6.2 mm, patella and tibia 6.3, metatarsus 7.1, tarsus 1.8. Second patella and tibia 5.3 mm, third 2.5, fourth 4.

Diagnosis. Inside each epigynal depression of *M. spinipes* and *M. lacandon* is a membrane that forms a slanted, oval-shaped opening (Figs. 69, 78). Within each oval-shaped opening is a dark mark, which in *M. spinipes* takes up a small part of that opening, resulting in a cross-eyed appearance (Fig. 69). Also, in *M. spinipes* (Fig. 69), the edges of the epigynal depressions are less distinct than in *M. lacandon* (Fig. 78). The distal embolic apophysis of *M. spinipes* is arrow-shaped (Fig. 79), in contrast to a wider shovel-shape in *M. lacandon* (Fig. 79).

Variation. Average body length of 54 females examined 9.1 mm, range 5.5 to 12.4 mm. Average body length of 55 males examined 6.6 mm, range 3 to 10.8 mm.

Natural History. Mature specimens have been collected between August and early November (Fig. 335). Elevations range from near sea level in California to 2,600 m in central Mexico. Variation in sexual dimorphism appears to correlate with habitat and social structure (Piel, 1996). Webs are found in dry regions among mesquite, *Opuntia*, *Agave* (maguey), cultivated *Yucca*, and *Cactus*. Spiders live in medium to small social colonies, which vary in size in accordance with local habitat quality (Uetz, 1988a,b). This behavioral and ecological relationship is



Figures 60–66. *Metepeira rectangula* (Nicolet) (sp. 8; 37°48'S, 72°43'W). 60, male palpus, mesal. 61, epigynum, posterior. 62, epigynum, ventral. 63, male, dorsal. 64, male, ventral. 65, female, dorsal. 66, female, ventral.
 Figures 67–75. *Metepeira spinipes* F. O. P.-Cambridge (sp. 9 [67–72,74,75] 19°0'29"N, 99°15'50"W; [73] 39°18'N, 123°48'W). 67, male palpus, mesal. 68, epigynum, posterior. 69, epigynum, ventral. 70, male embolic division, ventral. 71, male, dorsal. 72, male, ventral. 73, female, ventral. 74, female, dorsal. 75, female, ventral.
 Figures 76–83. *Metepeira lacandon* new species (sp. 10; 16°45'N, 92°38'W). 76, male palpus, mesal. 77, epigynum, posterior. 78, epigynum, ventral. 79, male embolic division, ventral. 80, male, dorsal. 81, male, ventral. 82, female, dorsal. 83, female, ventral.

Scale bars: dorsum and venter figures 1.0 mm.

thought to occur as a result of the spiders pursuing a risk-sensitive foraging strategy (Uetz, 1996).

Distribution. Oregon to central Mexico (Levi, 1977, map 1; Map 6).

Records Examined. MEXICO *Aguascalientes*: Hwy 45, 5.3 mi N Aguascalientes, 21°57'N, 102°17'W, 7.ix.1967 (R. E. Leech, REL). *Baja California Sur*: Sierra Laguna, 17 air mi ENE Todos Santos, 23°34'N, 110°0'W, 15.xii.1979 (C. E. Griswold, CAS). *Chihuahua*: 22.4 mi S Miñaca, 28°24'N, 107°26'W, 23.viii.1950 (R. Smith, AMNH). *Durango*: 10 mi E El Salto, 23°12'N, 105°52'W, 8.viii.1947 (W. J. Gertsch, AMNH); 11 km W Suchil, 23°35'N, 104°5'W, 5.ix.1984 (W. J. Pulawski, CAS); 6 mi NE El Salto, 23°19'N, 105°50'W, 11.viii.1947 (W. J. Gertsch, AMNH); Las Puenteas [?], 26°49'N, 106°2'W, 23.vii.1947 (W. J. Gertsch, AMNH); Otinapa, 24°11'N, 105°2'W, 12.viii.1947 (W. J. Gertsch, AMNH); Palos Colorados, 24°2'N, 104°54'W, 5.viii.1947 (W. J. Gertsch, AMNH); Providencia, 26°44'N, 105°56'W, 24.viii.1947 (A. M. Davis, AMNH); SW Durango, 23°59'17"N, 104°45'47"W, 22.x.1994 (W. H. Piel, MCZ). *Guanajuato*: 30 mi SE Leon, 6 mi SE Silao, 20°52'N, 101°21'W, 6.ix.1964 (Jean & Wilton Ivie, AMNH); 6.3 mi NW León, 21°13'N, 101°43'W, 6.ix.1967 (R. E. Leech, REL); between Morelion & Cuitzeo, 20°5'36"N, 101°9'28"W, 20.x.1994 (W. H. Piel, MCZ); near San Miguel de Allende, 20°55'N, 100°45'W, 16.ix.1976 (C. E. Griswold, CAS); S San Miguel de Allende, 20°46'36"N, 100°47'28"W, 20.x.1994 (W. H. Piel, MCZ); San Miguel de Allende. Road SW town, 20°52'N, 100°56'W, 25.x.1982 (George Uetz, MCZ). *Hidalgo*: 18 mi E Huichapan, off Hwy 45, 20°23'N, 99°22'W, 25.viii.1984 (W. D. Sissom, C. Myers & L. Born, MCZ); 4 mi N Tizayuca, 19°54'N, 98°59'W, 20.xi.1946 (E. S. Ross, CAS); 41 km N Zimapan, 20°54'N, 99°13'W, 10.viii.1991 (W. H. Piel & G. S. Bodner, MCZ); Apulco, 20°19'N, 98°20'W, 6.x.1947 (H. Wagner, AMNH); Ozumbilla, 20°9'N, 101°16'W, 2.x.1957 (R. Dreisbach, MCZ); Pachuca, 20°7'N, 98°44'W, 30.viii.1957 (R. Dreisbach, MCZ); Tenango de Doria, 20°19'N, 98°13'W, 5.x.1947 (H. Wagner, AMNH). *Jalisco*: 12 mi S Mazamitla, 19°47'N, 103°8'W, 5.xii.1948 (H. B. Leech, CAS); Charco Ondo, 30 km W Ojuelos, 21°47'N, 101°53'W, 25.ix.1945 (H. Wagner, AMNH). *México*: Ixtapan de la Sal, 18°50'N, 99°41'W, 24.viii.1946 (H. Wagner, AMNH); Nevado de Toluca, 19°18'N, 99°44'W, 8.iv.1979 (George Uetz, MCZ); San Juan Teotihuacán, 19°41'N, 98°52'W, 4.xi.1939 (C. M. Bogert & H. E. Vokes, AMNH); Tenancingo, 18°58'N, 99°36'W, 6.ix.1946 (H. Wagner, AMNH), 1.x.1946 (H. Wagner, AMNH), 15.x.1946 (H. Wagner, AMNH); Tenango del Valle, 19°7'N, 99°33'W, 25.viii.1946 (H. Wagner, AMNH), 27.viii.1946 (H. Wagner, AMNH); Teotihuacán, 19°41'N, 98°52'W, 31.viii.1959 (A. F. Archer, AMNH); Tepetzotlán,

19°43'N, 99°13'W, 26.x.1982 (George Uetz, MCZ), 21.ii.1983 (George Uetz, MCZ), 5.x.1983 (George Uetz, MCZ); Toluca, 19°18'N, 99°44'W, 10.viii.1978 (George Uetz, MCZ), 1.viii.1986 (George Uetz, MCZ); Toluca, at bottom of mountain near Parque Cuernavaca, 19°18'N, 99°44'W, 10.viii.1978 (George Uetz, MCZ); Toluca, E of town on Paseo Tollocan [?], 19°18'N, 99°42'W, 23.x.1982 (George Uetz, MCZ). *México D. F.*: 19°25'N, 99°10'W, 12.x.1940 (H. Wagner, AMNH), 28.xii.1940 (R. H. Crandall, AMNH), 15.ix.1943 (H. & D. Frizzell, AMNH); Contreras, 19°18'N, 99°17'W, 4.xii.1944 (H. Wagner, AMNH), 15.ix.1965 (N. L. H. Krauss, AMNH); Delegación Tlalpan, Colonia Santa Ursula Xitla, 19°16'0"N, 99°10'25"W, 12.x.1994 (W. H. Piel, MCZ); Desierto de los Leones, 19°22'N, 99°16'W, 15.ix.1941 (H. Wagner, AMNH); El Xitle, 18°61'N, 99°17'W [?], 12.viii.1942 (C. Tellez, AMNH); Hacienda Córdoba, 19°26'N, 99°10'W [?], 29.x.1944 (H. Wagner, AMNH); Oqueros, 18°62'N, 99°17'W [?], 5.vii.1943 (M. Cardenas, AMNH); Mexico City, 19°25'N, 99°10'W, 1.xi.1941 (C. Velo, AMNH), 25.ix.1957 (R. Dreisbach, MCZ); Mixcoac, 19°23'N, 99°11'W (AMNH), 13.x.1940 (A. F. Archer, AMNH); Mixenac, 19°25'N, 99°10'W, 13.x.1940 (H. Wagner, AMNH); Pedregales, 18°60'N, 99°17'W [?], 15.viii.1909 (AMNH); Petregal [?], 18°60'N, 99°17'W, 1.xii.1943 (AMNH); Rancho Córdoba, 19°27'N, 99°10'W, 29.x.1944 (H. Wagner, AMNH); Tlalpan, 19°17'N, 99°10'W, 7.viii.1991 (W. H. Piel & G. S. Bodner, MCZ). *Michoacan*: 25 mi W La Barca nr. Lago de Chapala, 20°17'N, 102°34'W, 11.ix.1976 (C. E. Griswold & Jackson, CAS); between Patzcuaro & Uruapan, 19°29'19"N, 101°48'20"W, 19.x.1994 (W. H. Piel, MCZ); Hills N of Patzcuaro, 19°45'N, 101°36'W, 24.viii.1959 (A. F. Archer, AMNH); Hwy 110, 4 mi W Jiquilpan, 19°59'N, 102°47'W, 2.viii.1967 (R. E. Leech, REL); Hwy 15, 9.5 mi W Morelia, 19°42'N, 101°16'W, 18.viii.1967 (R. E. Leech, REL); Lake Chapala, NW of Cojumatlan, 20°10'N, 102°53'W, 7.ix.1966 (Jean & Wilton Ivie, AMNH); Monte de Zacapu, 19°47'N, 101°50'W, 24.viii.1959 (A. F. Archer, AMNH). *Morelos*: Cuernavaca, 18°55'N, 99°15'W (AMNH), 15.ix.1941 (H. Wagner, AMNH), 18.xi.1946 (M. G. Bradt, AMNH); Cuernavaca/Tepetzotlan, interchange between I-95 & 115, 18°55'N, 99°13'W, 7.viii.1978 (MCZ); Huitzilac, 19°2'2"N, 99°16'13"W, 13.x.1994 (W. H. Piel, MCZ); North of Cuernavaca, 18°58'11"N, 99°14'37"W, 11.x.1994 (W. H. Piel, MCZ); S of Huitzilac, 19°0'29"N, 99°15'50"W, 16.x.1994 (W. H. Piel, MCZ). *Puebla*: 6 mi E Río Frio, 19°20'N, 98°35'W, 22.viii.1964 (Jean & Wilton Ivie, AMNH); Puebla, 19°3'N, 98°12'W, 21.x.1982 (George Uetz, MCZ). *San Luis Potosí*: 3 km W Pilares, 21°55'34"N, 100°48'6"W, 21.x.1994 (W. H. Piel, MCZ); Ciudad del Maíz, 22°24'N, 99°36'W, 25.viii.1954 (R. Dreisbach, MCZ). *Sonora*: 46 mi S Agua Prieta on Highway 10, 31°0'N, 109°16'W, 15.viii.1959 (B. A. Branson, AMNH); Hermosillo, 29°4'N, 110°55'W, 20.ix.1952 (B. Malkin & V. E. Thatcher, AMNH); Sierra Man-

zanal, 30°50'N, 110°10'W, 14.ix.1976 (Roth & Schroepfer, MCZ). *Tlaxcala*: Huamantla, 19°19'N, 97°56'W [?], 15.vii.1981 (C. Gold, CAS). *Veracruz*: 15 mi W. Banderilla, 19°39'N, 97°8'W, 31.x.1973 (S. C. Williams & C. L. Mullinex, CAS); 15 mi West of Jalapa, 19°32'N, 97°9'W, 23.vi.1946 (A. M. & L. I. Davis, AMNH). *Zacatecas*: 13 mi N. Sombretete, 23°44'32"N, 103°47'10"W, 22.x.1994 (W. H. Piel, MCZ); Canutillo, 24°47'N, 101°31'W, 14.viii.1947 (W. J. Gertsch, AMNH); S. Zacatecas, 22°45'7"N, 102°29'37"W, 22.x.1994 (W. H. Piel, MCZ). *USA. Arizona*: Southwestern Research Station, Chiricahua Mtns., 31°35'N, 109°14'W, 20.viii.1976 (V. Roth, MCZ). *California*: 26 mi W. Santa Rosa on Hwy 116, 38°31'N, 123°4'W, 19.ix.1976 (M. E. Thompson, MCZ); Mendocino, 39°18'N, 123°48'W, 18.viii.1959 (W. J. Gertsch, MCZ); Monterey, 36°36'N, 121°54'W, 1.ix.1949 (A. F. Archer, MCZ); Pacific Grove, 36°37'N, 121°56'W (R. V. Chamberlin, MCZ); Palo Alto, 37°27'N, 122°9'W (Doane, MCZ); Salt marsh on N shore of San Pablo Bay, Vallejo, 38°8'N, 122°27'W (D. Spiller, MCZ).

10. *Metepeira lacandon* new species **Figures 76–83, 332; Map 6**

Holotype. Male from San Cristobal, Chiapas, Mexico. The specific name is a noun in apposition after the Indian people who live in Chiapas. Holotype deposited in the AMNH.

Description. Female paratype from San Cristobal, Chiapas, Mexico. Reddish carapace, slightly darker in anterior half, lighter behind lateral eyes (Fig. 82). Leg articles yellowish, gradually turning reddish brown distally. Femur I with row of four or five macrosetae on anterior side; two to four setae on anteroventral side. Anterior shoulders of abdomen black. Branches of white fleur-de-lis shape in dorsal folium thinner than in most species (Fig. 82). Venter of abdomen black with wide white median line that extends about half the distance between epigynal groove and spinnerets (Fig. 83). Pair of very small white spots on either side of spiracle. Sternum black, often with central white spot (Fig. 83). Ratio of eye diameters: posterior medians and anterior medians 1.0, anterior laterals 1.3, posterior laterals 1.2. Anterior median eyes separated by 1.7 diameters, posterior median eyes by 1.0, anterior median eyes separated from anterior laterals by 4.5 diameters of anterior lateral eyes, lateral eyes separated by 0.1 their diameters.

ters. Total length 11.5 mm. Carapace 4.6 mm long, 3.6 wide. First femur 5.3 mm, patella and tibia 5.3, metatarsus 4.9, tarsus 1.6. Second patella and tibia 4.4 mm, third 2.7, fourth 4.

Male holotype. Carapace, dorsum, venter, sternum as in female (Figs. 80, 81). Distal halves of femora, tibia reddish brown, elsewhere yellowish. Patellae, metatarsi reddish. Femur I with row of four or five macrosetae on anterior side; six or seven on anteroventral side. Ratio of eye diameters: posterior medians and anterior medians 1.1, anterior laterals 1.5, posterior laterals 1.3. Anterior median eyes separated by 1.7 diameters, posterior median eyes by 0.9, anterior median eyes separated from anterior laterals by 3.3 diameters of anterior lateral eyes, lateral eyes separated by 0.3 their diameters. Total length 6.8 mm. Carapace 3.5 mm long, 2.7 wide. First femur 5.3 mm, patella and tibia 3.9, metatarsus 5.6, tarsus 1.7. Second patella and tibia 4.4 mm, third 2.3, fourth 3.4.

Diagnosis. Inside each epigynal depression of *M. lacandon* and *M. spinipes* is a membrane that forms a slanted, oval-shaped opening (Figs. 69, 78). Within each oval-shaped opening is a dark mark, which in *M. lacandon* takes up only a large part of that opening, resulting in a less cross-eyed appearance (Fig. 78). Also, in *M. lacandon* (Fig. 78), the edges of the epigynal depressions are more distinct than in *M. spinipes* (Fig. 69). The distal embolic apophysis of *M. lacandon* is more shovel-shaped (Fig. 79) than the thinner, arrow-shaped one in *M. spinipes* (Fig. 70).

Variation. Average body length of three females examined 8.5 mm, range 7.5 to 10 mm. Average body length of four males examined 5.8 mm, range 4.2 to 6.8 mm.

Natural History. Mature specimens were collected between July and September (Fig. 332) from oak–pine woodland. Elevations range from 1,700 to 2,300 m.

Distribution. Mountainous regions of Chiapas, Mexico (Map 6).

Records Examined. MEXICO *Chiapas*: 12 km NW Comitán, 16°23'N, 92°15'W, 30.viii.1976 (E. S. Ross, CAS); 4 mi SE San Cristobal, 16°42'N, 92°36'W, 23.viii.1966 (Jean & Wilton Ivie, AMNH); 5 km W San Cristobal de Las Casas on HWY 190, 16°44'N, 92°41'W, 27.vii.1983 (W. Maddison & R. S. Anderson, MCZ); 5 mi W San Cristobal, 16°45'N, 92°41'W, 23.viii.1966 (Jean & Wilton Ivie, AMNH); San Cristobal, 16°45'N, 92°38'W, 13.ix.1947 (H. Wagner, AMNH); San Cristobal de las Casas, 16°45'N, 92°38'W, 22.vii.1947 (C. J. & M. Goodnight, AMNH); Tenejapa, 16°49'N, 92°31'W, 22.vii.1950 (C. J. & M. Goodnight, AMNH).

Metepeira nigriventris Group

There are five species in the *Metepeira nigriventris* group: *Metepeira nigriventris*, *Metepeira tarapaca*, *Metepeira calamuchita*, *Metepeira galathea*, and *Metepeira karkii*. These closely related species are often hard to distinguish because their genitalia are similar, yet highly variable within a species. This species group is easily recognized by the distinctive shape of the scape and similarities in palp morphology. Typically the base of the scape originates anteriorly and projects ventrally before curving posteriorly. This projection creates an overhang and a noticeable gap between the scape and the genital openings (e.g., Figs. 85, 86, 101, 102). The embolus is thick and has a large, prominent, distal apophysis that hides under the terminal apophysis (Figs. 84, 92, 100, 110, 121).

11. *Metepeira nigriventris* (Taczanowski) Figures, 84–91, 310; Map 5

Epeira nigriventris Taczanowski, 1878: 151, fig. 6, ♀.
Female lectotype from Lake Junín, Peru, in PAN, type lost. Keyserling, 1893: 217, fig. 161, ♀, ♂.

Araneus nigriventris:—Chamberlin, 1916: 248. Bonnet, 1955: 550.

Metepeira nigriventris:—Chamberlin and Ivie, 1942: 74, figs. 211–214, ♀, ♂. Platnick, 1993: 449.

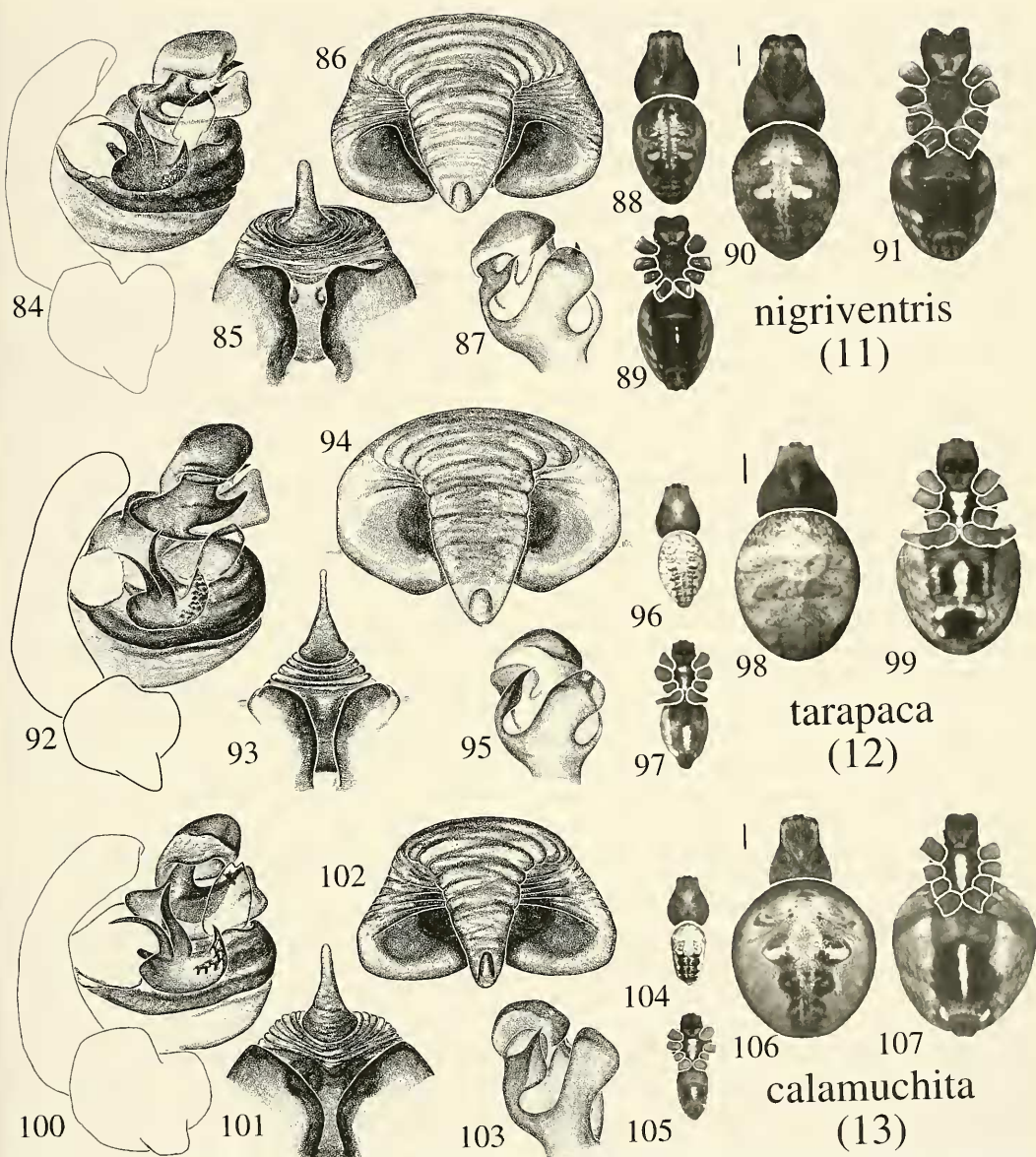
Note. Although the type is lost, the type locality and Taczanowski's descriptions are sufficient to recognize the species.

Description. Female from 12 km west of Tarma, Junín, Peru. Carapace dark brown, light around eyes with lateral posterior extensions (Fig. 90). Proximal halves of leg articles yellow, distal halves black. Femur I with row of four macrosetae on anterior

side; five on anteroventral side. Dorsum darker and white fleur-de-lis pattern smaller than in most species (Fig. 90). Venter mostly black with reduced, short, thin, white median line (Fig. 91). Sternum entirely black. Ratio of eye diameters: posterior medians and anterior medians 1.0, anterior laterals 1.4, posterior laterals 1.4. Anterior median eyes separated by 1.8 diameters, posterior median eyes by 1.2, anterior median eyes separated from anterior laterals by 5 diameters of anterior lateral eyes, lateral eyes separated by 0.4 their diameters. Total length 11 mm. Carapace 5.1 mm long, 4.2 wide. First femur 5.5 mm, patella and tibia 5.8, metatarsus 5.5, tarsus 1.9. Second patella and tibia 5.3 mm, third 3.3, fourth 4.5.

Male from same locality as female. Anterior margin of chelicerae with large, swollen tooth and several denticles. Carapace reddish brown with lighter eye region, lateral posterior extensions, and long, thin median white line (Fig. 88). Femur I with row of about five macrosetae on anterior side; nine on anteroventral side. Coloration of legs, dorsum, venter, and sternum as in female (Figs. 88, 89). Ratio of eye diameters: posterior medians and anterior medians 1.1, anterior laterals 1.3, posterior laterals 1.3. Anterior median eyes separated by 1.8 diameters, posterior median eyes by 1.2, anterior median eyes separated from anterior laterals by 3.7 diameters of anterior lateral eyes, lateral eyes separated by 0.4 their diameters. Total length 9 mm. Carapace 4 mm long, 3.2 wide. First femur 5.8 mm, patella and tibia 6.2, metatarsus 6.5, tarsus 1.7. Second patella and tibia 4.5 mm, third 2.8, fourth 4.

Diagnosis. *Metepeira nigriventris* is easily distinguished from other species in the *M. nigriventris* group by its dark pigmentation. As its name implies, the sternum is black and the white ventral mark on the abdomen is reduced to a much shorter and thinner line (Figs. 88–91). While the sternum of *M. karkii* is similarly dark, the dorsal and ventral markings on the abdomen are much lighter (compare Figs. 88–91



Figures 84–91. *Metepeira nigriventris* (Taczanowski) (sp. 11; 11°25'S, 75°48'W). 84, male palpus, mesal. 85, epigynum, posterior. 86, epigynum, ventral. 87, male embolic division, ventral. 88, male, dorsal. 89, male, ventral. 90, female, dorsal. 91, female, ventral.

Figures 92–99. *Metepeira tarapaca* new species (sp. 12; 21°39'S, 69°33'W). 92, male palpus, mesal. 93, epigynum, posterior. 94, epigynum, ventral. 95, male embolic division, ventral. 96, male, dorsal. 97, male, ventral. 98, female, dorsal. 99, female, ventral.

Figures 100–107. *Metepeira calamuchita* new species (sp. 13; 32°4'S, 64°33'W). 100, male palpus, mesal. 101, epigynum, posterior. 102, epigynum, ventral. 103, male embolic division, ventral. 104, male, dorsal. 105, male, ventral. 106, female, dorsal. 107, female, ventral.

Scale bars: dorsum and venter figures 1.0 mm.

with Figs. 125–128). The epigynum of *M. nigriventris* has a wider membrane over the openings that is visible on either side of a very wide scape (Fig. 86). In contrast, this feature is hidden behind a thinner scape in its likely sister species, *M. tarapaca* (Fig. 94). The overall shape of the epigynum (Fig. 86) and the pair of small notches in the posterior lobes (Fig. 85) also make this species distinctive. The male palp of *M. nigriventris* has an embolus that is relatively slimmer and more graceful than those of other species in the *M. nigriventris* species group (compare Fig. 84 with Figs. 92, 100, 109–110, 121). The shape of the embolus and its distal apophysis differs from other species (compare Fig. 87 with Figs. 95, 103, 112, 124).

Variation. Average body length of 25 females examined 9.5 mm, range 7.2 to 11.5 mm. Average body length of 16 males examined 7.4 mm, range 5.3 to 9.5 mm.

Natural History. Spiders are commonly found around Lake Titicaca living in medium and large colonies among power lines, Bolivian pines, *Cactus*, *Bacharis*, rock outcroppings, and tall grasses (L. Rayer, personal communication, and various locality labels). Mature specimens have been collected throughout the year except September and October (Fig. 310). Median elevation, 3,900 m.

Distribution. High altitude regions of southern Peru and western Bolivia (Map 5).

Records Examined. ARGENTINA *Jujuy*: Puma-luasi, 22°17'S, 65°41'W, 8.xi.1970 (L. E. Peña, MCZ). BOLIVIA *La Paz*: 45 mi S La Paz, 17°9'S, 67°36'W, 25.ii.1951 (E. S. Ross & Michelbacher, CAS); 70 mi S La Paz, 17°30'S, 67°36'W, 25.ii.1951 (E. S. Ross & Michelbacher, CAS); La Paz, Avenida Sport Club, 16°30'S, 68°9'W, 4.i.1959 (A. M. Nadler, AMNH); La Paz, in garden of house, 16°30'S, 68°9'W, 15.iv.1959 (R. Walsh, AMNH); Lake Titicaca, Copacabana, Yampupata, & Isla del Sol, 16°10'S, 69°5'W, 17.v.1995 (L. Rayer, MCZ); near La Paz, 16°30'S, 68°9'W, 24.v.1958 (R. Walsh, AMNH); S end of Lake Titicaca, 100 km NW La Paz, 16°10'S, 69°5'W, 5.vii.1958 (R. Walsh, AMNH); Tiahuanaco, Puma Puerto Ruins, 16°33'S, 68°42'W, 1.ii.1973 (Ann Moreton, MCZ). *Oruro*: 6 km N Challapata, 18°51'S, 66°47'W, 23.ii.1951 (E. S. Ross & Michelbacher,

CAS); Gorge Uhuschlucht, near Oruro, 17°59'S, 67°9'W, 7.ii.1954 (Forster & Schindler, ZSM). *Potosí*: Villazon, 22°6'S, 65°36'W, 30.xii.1984 (L. E. Peña, AMNH). PERU *Apurímac*: Chincheros, 13°30'48"S, 73°42'47"W, 12.xii.1980 (C. Gold, CAS); Puna near Abancay, 13°38'2"S, 72°52'52"W, 15.xii.1947 (W. Weyrauch, CAS). *Ayacucho*: Puquio, 14°42'S, 74°8'W, 15.iv.1950 (F. Blancas, MUSM); San Antonio (Puquio), 14°47'S, 74°7'W, 1.xi.1985 (D. Silva, MUSM). *Cusco*: Chequerec, 13°23'S, 72°8'W, 2.ix.1993 (J. Ochoa Camara, MCZ); Cusco, 13°31'6"S, 71°58'41"W, 8.viii.1965 (P. & B. Wygodzinsky, AMNH). *Junín*: 8 mi W Tarma, 11°25'S, 75°48'W, 6.i.1955 (E. I. Schlinger & E. S. Ross, CAS); Cochas Bajo, 11 km W Tarma, 11°25'21"S, 75°46'11"W, 27.iii.1988 (J. Palmer & D. Smith, MCZ); Cochas Bajo, 11 km W Tarma, rock ledge in agricultural valley, 11°25'21"S, 75°46'11"W, 29.iii.1988 (J. Palmer, MCZ); Huancayo, 12°4'S, 75°14'W, 15.vi.1947 (W. Weyrauch, AMNH); Oroya, 11°32'S, 75°54'W, 12.iv.1914 (M. P. Anderson, AMNH). *Lima*: Bosque de Zarate, 11°53'S, 76°27'W, 18.i.1981 (J. Francke, MUSM). *Puno*: 10 mi N Ayaviri, 14°45'S, 70°35'W, 1.iii.1951 (E. S. Ross & Michelbacher, CAS); Camacane, 15°55'S, 69°50'W, 20.xi.1955 (L. E. Peña, IRSNB); Isla Taquili, Lago Titicaca, 15°46'S, 69°41'W, 23.xii.1980 (C. Gold, CAS); Juli (col. Chucuito), 16°13'S, 69°27'W, 7.xi.1952 (F. Blancas, MUSM); near Chucuito, Lago Titicaca, 15°50'S, 69°48'W, 10.iii.1953 (M. Koepecke, MUSM); Puna, Lake Titicaca, 15°50'S, 70°2'W, 15.vi.1947 (W. Weyrauch, AMNH); Puno, 15°50'S, 70°2'W (Soukup, AMNH); Yunguyo, downtown plaza, 16°15'S, 69°5'W, 31.i.1973 (Ann Moreton, MCZ).

12. *Metepeira tarapaca* new species Figures 92–99, 305; Map 7

Holotype. Male from Quillagua, Antofagasta, Chile, 4.ii.1965, L. E. Peña, in MCZ. The specific name is a noun in apposition after a Chilean province where it is abundant.

Description. Female paratype from Quillagua, Antofagasta, Chile. Light reddish brown carapace, white in center and around eyes with lateral posterior extensions (Fig. 98). Legs yellowish white, ringed brown at distal ends of articles. Femur I with row of four macrosetae on anterior side; three on anteroventral side. Dorsal folium white with black speckles (Fig. 98). Venter of abdomen black with wide, white median line, sometimes flanked by thinner white lines that together form a U-shape posteriorly (Fig. 98). Sternum black with median white line, sometimes broken (Fig. 99). Ratio of eye

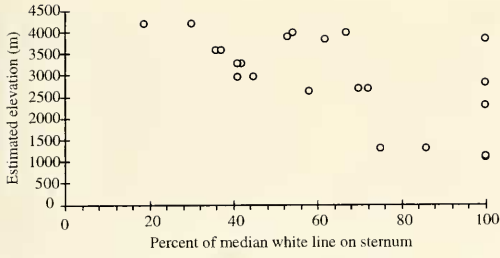


Figure 108. Elevation of collection localities of mature female *M. tarapaca* with differing amounts of white on the sternum. Spiders with a median white line covering 100% of the sternum length are found at a wide altitude range. Spiders with a median white mark covering only a short length of the sternum are only found at high elevations. Elevations estimated from NOAA database of 5- by 5-minute geographic tiles.

diameters: posterior medians and anterior medians 1.0, anterior laterals 1.3, posterior laterals 1.2. Anterior median eyes separated by 1.4 diameters, posterior median eyes by 1.0, anterior median eyes separated from anterior laterals by 3.4 diameters of anterior lateral eyes, lateral eyes separated by 0.1 their diameters. Total length 7.8 mm. Carapace 3.2 mm long, 2.8 wide. First femur 4.3 mm, patella and tibia 4.4, metatarsus 4, tarsus 1.2. Second patella and tibia 3.8 mm, third 2.1, fourth 3.2.

Male holotype. Light reddish brown carapace, lighter around eyes and white mark in center (Fig. 96). Legs yellowish white, gradually growing darker toward distal ends of articles. Femur I with row of four macrosetae on anterior side; five on anteroventral side. Dorsal folium, venter, and sternum as in female (Figs. 96, 97). Ratio of eye diameters: posterior medians and anterior medians 1.0, anterior laterals 1.2, posterior laterals 1.1. Anterior median eyes separated by 1.5 diameters, posterior median eyes by 1.0, anterior median eyes separated from anterior laterals by 2.5 diameters of anterior lateral eyes, lateral eyes separated by 0.1 their diameters. Total length 4.4 mm. Carapace 2 mm long, 1.6 wide. First femur 3.3 mm, patella and tibia 3.5, metatarsus 3.3, tarsus 1. Second patella and tibia 2.8 mm, third 1.4, fourth 2.2.

Diagnosis. Unlike *M. nigriventris* or *M.*

karkii, *M. tarapaca* has a white mark on the sternum (Figs. 97, 99). The epigynum is close to that of *M. nigriventris*, except that it is less robust (compare Fig. 93 with Fig. 85), and the membrane just over the openings cannot be seen behind the thinner scape (compare Fig. 86 with Fig. 94). Unlike *M. calamuchita*, the epigynum of *M. tarapaca* does not widen posteriorly (compare Fig. 94 with Fig. 102); unlike *M. karkii*, the posterior epigynal lobes are not swollen (compare Fig. 94 with Fig. 123); unlike *M. galathea*, the black sclerotized circles behind the epigynal openings are larger and not shifted posteriorly (compare Fig. 94 with Figs. 118–120). The segment of the embolus between the basal and distal embolic apophysis is relatively thicker than in other members of the *M. nigriventris* species group (compare Fig. 92 with Figs. 84, 100, 109, 121). The terminal division of the male palp in *M. tarapaca* shows a distal embolic apophysis that differs in shape from that of other species (compare Fig. 95 with Figs. 87, 103, 117, 124).

Variation. Average body length of 22 females examined 7.4 mm, range 5 to 11.5 mm. Average body length of six males examined 5.9 mm, range 4.4 to 7.3 mm. The dorsum and venter are often darker than the holotype. Many lack the flanking lines and the U-shape on the venter; some at higher elevation have a much reduced white line on the sternum.

Natural History. Mature specimens have been collected throughout the year, especially between January and April (Fig. 305). V. Roth (vial label) notes that these spiders live in a social colony. M. Roy (personal communication) reports that colonies can reach 200 individuals. Median elevation, 2,800 m.

Distribution. Moderately high altitudes in northern Chile and southern Peru (Map 7).

Records Examined. CHILE Antofagasta: 7 km S Toconao, 23°11'S, 68°1'W, 25.xii.1988 (V. & B. Roth, CAS); Aguas Blancas [?] (= 24°11'S 69°51'W), Toconao, 23°11'S, 68°1'W, 11.x.1955 (L. E. Peña,

IRSN); Antofagasta, 23°39'S, 70°24'W, 15.xi.1975 (L. E. Peña, AMNH); Quillagua, 21°39'S, 69°33'W, 4.ii.1965 (L. E. Peña, MCZ), 21.i.1973 (W. C. Sedgwick, MCZ); Río Loa, 25 km S Quillagua, 21°54'S, 69°33'W, 20.viii.1966 (E. Schlenger & M. Irwin, CAS). *Elloa*: Thermo Puritania, 35 km N San Pedro de Atacama, 22°37'S, 68°13'W, 25.xii.1988 (V. & B. Roth, CAS). *Tarapaca*: Arica Timar, Alciado [?], 18°45'S, 69°42'W, 22.iii.1973 (N. Hichins, AMNH); Arikuida, 19°38'S, 69°32'W, 29.iv.1969 (L. E. Peña, MCZ); Canchones, 20°27'S, 69°37'W, 29.i.1973 (W. C. Sedgwick, MCZ); Chapiquilita, 19°18'S, 69°25'W, 6.vi.1968 (L. E. Peña, MCZ); Chiapa, 19°32'S, 69°13'W, 24.iv.1969 (L. E. Peña, MCZ); Pica, 20°30'S, 69°21'W, 26.i.1973 (W. C. Sedgwick, MCZ); Poroma, Quebrada de Tarapaca, 19°52'S, 69°11'W, 20.iv.1969 (L. E. Peña, MCZ); Quisama, 19°19'S, 69°28'W, 5.vi.1968 (L. E. Peña, MCZ). PERU *Arequipa*: Arequipa, 16°23'56"S, 71°32'6"W, 15.vii.1955 (A. Meza, MZSP); Chiguata, near Arequipa, 16°24'S, 71°24'W, 15.ii.1948 (W. Weyrauch, MUSM).

13. *Metepeira calamuchita* new species Figures 100–107, 308; Map 5

Holotype. Male from Calamuchita, Córdoba, Argentina, 15.i.1955, J. M. Viana, in MACN. The specific name is a noun in apposition after the locality.

Description. Female paratype from Calamuchita, Córdoba, Argentina. Carapace reddish brown, light around eyes with lateral posterior extensions (Fig. 106). Leg articles annulated distally. Femur I with row of six or seven macrosetae on anterior side; five on anteroventral side. Anterior portion of dorsal folium lighter than in most species (Fig. 106). Venter black with wide white median line and pair of large white spots on either side of spiracle (Fig. 107). Sternum brownish black with wide, white median line (Fig. 107). Ratio of eye diameters: posterior medians and anterior medians 1.1, anterior laterals 1.4, posterior laterals 1.3. Anterior median eyes separated by 1.6 diameters, posterior median eyes by 0.9, anterior median eyes separated from anterior laterals by 3.2 diameters of anterior lateral eyes, lateral eyes separated by 0.2 their diameters. Total length 8.9 mm. Carapace 3.4 mm long, 2.8 wide. First femur 4.5 mm, patella and tibia 4.7, metatarsus 4.7, tarsus 1.3. Second patella and tibia 4.1 mm, third 2.3, fourth 3.5.

Male holotype. Carapace brown with

light, triangular, median mark pointing posteriorly (Fig. 104). Leg articles white, darkening brown distally. Femur I with row of four macrosetae on anterior side; five or six on anteroventral side. Anterior dorsal folium mostly white, posterior mostly black (Fig. 104). Venter as in female (Fig. 105). Broad white median mark on sternum (Fig. 105). Ratio of eye diameters: posterior medians and anterior medians 1.1, anterior laterals 1.4, posterior laterals 1.4. Anterior median eyes separated by 1.4 diameters, posterior median eyes by 0.9, anterior median eyes separated from anterior laterals by 2.2 diameters of anterior lateral eyes, lateral eyes separated by 0.2 their diameters. Total length 4.4 mm. Carapace 2.3 mm long, 1.8 wide. First femur 3.8 mm, patella and tibia 3.7, metatarsus 4, tarsus 1.2. Second patella and tibia 2.9 mm, third 1.5, fourth 2.5.

Diagnosis. *Metepeira calamuchita* differs from others in the *M. nigriventris* species group by the large, scooped openings, and posteriorly widening epigynum (Fig. 102). The epigyna of *M. tarapaca* and *M. calamuchita* both have deep scooped-out openings, but these are angled posteriorly in the latter (Fig. 102) and laterally in the former (Fig. 94). The male palp of *M. calamuchita* is easily distinguished from that of other species by the widened (Fig. 100) and inwardly curved (Fig. 103) "dewlap" under the embolus.

Variation. Average body length of 13 females examined 7.7 mm, range 5 to 9.8 mm. Average body length of five males examined 5.2 mm, range 4 to 6.4 mm. Two specimens collected near 2,700 m in Iturbide, Jujuy, Argentina, have entirely dark sterna. In contrast, most specimens are found at lower elevations with white median lines on their sterna.

Natural History. Mature specimens have been collected between October and July, although they are probably available throughout the year (Fig. 308). Most elevations range from 150 to 1,700 m, with one population at 2,700 m.

Distribution. Northern Argentina, at

mostly lower altitudes east of the Andes (Map. 5).

Records Examined. ARGENTINA Buenos Aires: Las Espaduas [?], Sierra de la Ventana, 38°9'S, 61°48'W, 15.x.1973 (Maury & Cesari, MACN); Sierra de la Ventana, 38°9'S, 61°48'W, 15.vii.1972 (Amarilla, MACN). Córdoba: C. Paz, 31°24'S, 64°31'W, 15.v.1940 (C. Marti, MACN); Calamuchita, 32°4'S, 64°33'W, 15.xii.1941 (J. M. Viana, MACN), 15.i.1955 (J. M. Viana, MACN); Mina Clarco, 31°43'S, 65°0'W, 15.iv.1973 (Stiebel, MACN). Jujuy: Iturbe, 22°59'S, 65°21'W, 22.ii.1983 (L. E. Peña, AMNH). La Rioja: Ilias [?], 29°5'S, 66°19'W (P. M. Gomez, MACN). San Luis: Chosmes and Desaguadero (Mendoza), 33°24'30"S, 67°0'0"W, 14.iv.1967 (L. E. Peña, MCZ). Santiago del Estero: Santiago del Estero, 27°47'S, 64°16'W (AMNH), 3.iv.1965 (H. W. Levi, MCZ); 70 km W Santiago, 27°47'S, 65°25'W, 3.iv.1965 (H. W. Levi, MCZ); Quebrachos: Sumampa, Parayacu [?], 29°22'S, 63°28'W, 15.xi.1944 (Maldonado Bruzzone, MLP).

14. *Metepeira galathea* (Thorell) Figures 108–120, 304; Map 7

Epeira galathea Thorell, 1891: 53. Female holotype from "Cobija, Bolivia," now, Cobija, Antofagasta, Chile, in the UZMK, examined.

Araneus galathea:—Bonnet, 1955: 506.

Metepeira galathea:—Levi, 1991: 179. Platnick, 1993.

Metepeira cereicola nomen nudum, female in AMNH but no description has been found. Female manuscript type from Salamanca, Coquimbo, Chile, collected by Archer on 30.iv.1961.

Note. Thorell (1891) listed the holotype's locality as "Cobija, Bolivia." While Cobija, Bolivia exists (11°02'S 65°44'W), it is an unlikely locality for the corvette Galathea to visit on its voyage to southern Asia because it would have meant climbing over the Andes. Instead, the port town of Cobija, Chile (22°33'S 70°16'W) is much more likely, especially since this region of Chile was under Bolivian administration throughout the period of Galathea's voyage, 1845–1847 (Paynter et al., 1975).

Description. Female from Chile Chico, Aisén province, Chile. Reddish brown carapace with white setae, light around eyes, lateral posterior extensions, central arrow-shaped mark (Fig. 113). Legs light yellow, articles annulated distally. Femur I with row of four or five macrosetae on anterior side; two to four on anteroventral side. Dorsum with black and white setae. Folium speckled brown with a white fleur-de-lis that reduces posteriorly (Fig. 113). Venter brownish gray with wide median white

line and pair of large white spots on either side of spiracle. A pair of very faint white stitching parallel to and on either side of median line (Fig. 114). Sternum reddish brown, sometimes with small posterior and anterior white marks (Fig. 114). Ratio of eye diameters: posterior medians and anterior medians 1.0, anterior laterals 1.2, posterior laterals 1.2. Anterior median eyes separated by 1.7 diameters, posterior median eyes by 1.2, anterior median eyes separated from anterior laterals by 3.6 diameters of anterior lateral eyes, lateral eyes separated by 0.1 their diameters. Total length 7.8 mm. Carapace 3.5 mm long, 2.7 wide. First femur 3.7 mm, patella and tibia 3.9, metatarsus 3.5, tarsus 1.2. Second patella and tibia 3.4 mm, third 2.1, fourth 3.

Male from Chile Chico, Aisén province, Chile. Leg coloration as in female, except femur I mostly reddish brown with row of four macrosetae on anterior side; five on anteroventral side. Carapace, dorsum, venter and sternum as in female (Figs. 111, 112). Ratio of eye diameters: posterior medians and anterior medians 1.0, anterior laterals 1.3, posterior laterals 1.3. Anterior median eyes separated by 1.6 diameters, posterior median eyes by 1.2, anterior median eyes separated from anterior laterals by 3.3 diameters of anterior lateral eyes, lateral eyes separated by 0.4 their diameters. Total length 5.3 mm. Carapace 2.7 mm long, 2.1 wide. First femur 3.9 mm, patella and tibia 3.8, metatarsus 3.6, tarsus 1.1. Second patella and tibia 3.2 mm, third 1.8, fourth 2.6.

Diagnosis. Although the sternum of *M. galathea* varies from solid brown (Fig. 114) to brown with median white marks, the venter of the abdomen is surprisingly consistent. The venter has a wide brownish gray area and a short median white line flanked by very faint indications of parallel lines (Fig. 114). In contrast, the flanking lines in *M. karkii* thicken anteriorly (Fig. 128) and the venter of *M. nigriventris* is almost completely black (Fig. 91). Despite enormous variation in the hood of the

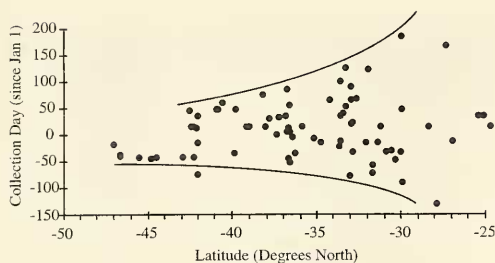


Figure 109. Days on which mature *M. galathea* were collected between 1937 and 1989 with latitude of the collection locality. Seasonality appears to be more restricted in southern regions than in northern regions.

Scale of abscissa: -150 = August 3; 1 = January 1; 150 = May 30.

scape with a corresponding variation in the position of the epigynal openings, it is nonetheless possible to distinguish the females of *M. galathea* from those of other species in the *M. nigriventris* group. Whether ventrally or posteriorly positioned, the epigynal openings and the darkened shadows of the sclerotized receptacles beneath them are relatively smaller than those of *M. calamuchita*, *M. tarapaca*, and *M. nigriventris* (compare Figs. 118–120 with Figs. 86, 94, 102). Also, *M. galathea* lacks the swollen posterior lobes present in *M. karkii* (compare Figs. 118–120 with Fig. 123). The shape of the embolus of *M. galathea* varies significantly (compare Fig. 109 with Fig. 110). However, unlike other species, the embolus of *M. galathea* has a distinct, round and swollen protrusion (Fig. 117).

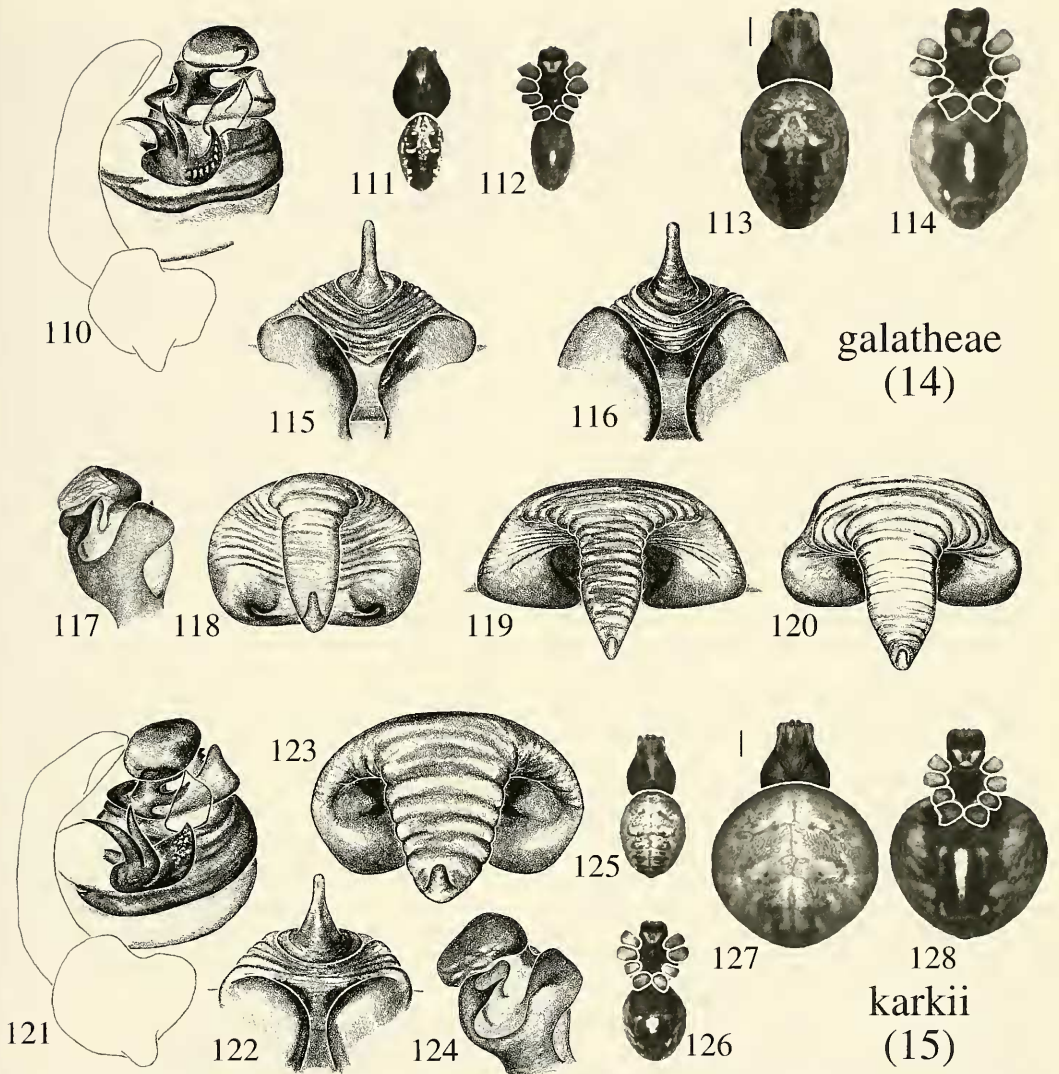
Variation. Average body length of 80 females examined 7.9 mm, range 4.8 to 12.5 mm. Average body length of 16 males examined 5.9 mm, range 3.5 to 8.1 mm. Epigyna vary considerably. Many, similar to the holotype, open ventrally and resemble a posteriorly widened version of *M. tarapaca* (Figs. 119, 120); cleared epigyna show relatively straight ducts connecting the epigynal openings with the seminal receptacles. These have a short distance between the openings and the hood of the scape. Others, usually in southern Chile, have posterior openings and look surpris-

ingly different (Fig. 118); cleared epigyna show S-shaped ducts connecting the openings with the seminal receptacles. These have an extended wrinkled area between the openings and the hood of the scape. However, several females [e.g., CHILE Bío-Bío: Chillán, 8.xi.1976 (G. Moreno, AMNH); Las Lajuelas, 11.i.1976 (G. Moreno, AMNH)] have epigyna that appear to be intermediate between the two forms. Furthermore, no somatic features were found to be sufficiently different, and little corresponding variation was found among sympatric males. It is possible that further collecting efforts will discover corresponding males, and future molecular studies may show that speciation has, in fact, occurred. But in the meantime, I am opting to treat both varieties as belonging to the same species.

Natural History. Although mature specimens have been collected throughout the year (Fig. 304), the seasonality of this species appears to depend on its latitude. At the 45th southern parallel, spiders are usually found in late November and December; at the 40th parallel, spiders occur between October and February; and at the 30th parallel, they are collected year round (Fig. 108). Median elevation, 550 m. Spiders are found on Patagonian scrub, dunes, and wire fences.

Distribution. Chile and Argentina (Map 7).

Records Examined. ARGENTINA Buenos Aires: Felipe Sola, 38°1'S, 62°50'W, 15.i.1944 (Prosen, MLP); Patagones, 40°48'S, 62°59'W, 15.ii.1937 (J. M. Viana, MACN); Sierra de la Ventana, 38°9'S, 61°48'W, 15.iii.1939 (J. C. Gario, MACN). CATAMARCA: Mutquin, 28°19'S, 66°10'W, 15.i.1963 (O. de Ferraris, AMNH). CHUBUT: 15 km S Epuen, 42°22'S, 71°21'W, 15.i.1986 (P. A. Goloboff, N. I. Platnick, & R. T. Schuh, AMNH); 19.5 km E Shaman, 44°27'S, 70°30'W, 19.xi.1966 (E. I. Schlinger & M. E. Irwin, CAS); 3 km N Puerto Lobos, 41°59'S, 65°6'W, 14.xii.1966 (E. I. Schlinger & M. E. Irwin, CAS); 35 km E Esquel, 42°54'S, 70°53'W, 18.xi.1966 (E. I. Schlinger & M. E. Irwin, CAS); El Hoyo [?], 42°4'S, 71°30'W (A. Kovacs, AMNH), 10.i.1962 (Andor Kovacs, AMNH); Epuen, 42°15'S, 71°23'W, 18.xi.1962 (Andor Kovacs, AMNH); Leleque, 42°28'S, 71°6'W, 12.ii.1965 (Andor Kovacs, AMNH); Los Manantiales,



Figures 110–120. *Metepeira galathea* (Thorell) (sp. 14 [110–114, 116, 117, 120] 46°33'S, 71°57'W; [115, 119] 29°50'S, 70°2'W; [118] 33°30'S, 71°25'W). 110, male palpus, mesal. 111, male, dorsal. 112, male, ventral. 113, female, dorsal. 114, female, ventral. 115, epigynum, posterior. 116, epigynum, posterior. 117, male embolic division, ventral. 118–120, epigynum, ventral. Figures 121–128. *Metepeira karkii* (Tullgren) (sp. 15; 51°38'S, 69°13'W). 121, male palpus, mesal. 122, epigynum, posterior. 123, epigynum, ventral. 124, male, dorsal. 125, male, ventral. 126, female, dorsal. 127, female, ventral. Scale bars: dorsum and venter figures 1.0 mm.

N of Comodoro-Rivadavia, 45°28'S, 69°29'W, 19.xi.1985 (L. E. Peña, AMNH); N of Camarones, Cantera, Namuncura, 44°46'S, 65°42'W, 17.xi.1985 (L. E. Peña, AMNH); Río Turbio, 42°13'S, 71°41'W (Andor Kovacs, AMNH), 12.i.1962 (Andor Kovacs, AMNH). *Córdoba*: 12 mi W Sampacho, 33°23'S, 64°43'W, 7.ii.1951 (E. S. Ross & Michelbacher, CAS); Arguello, 31°21'S, 64°15'W, 15.xii.1943 (J. A. De Car-

lo, MACN); Calamuchita, 32°4'S, 64°33'W, 15.xii.1940 (J. M. Viana, MACN); Sampacho, 33°23'S, 64°43'W, 7.ii.1951 (E. S. Ross & Michelbacher, CAS). *Mendoza*: Between Beazley and San Rafael, 34°10'S, 67°29'W, 4.iii.1983 (L. E. Peña, AMNH); Mendoza, 32°53'S, 68°49'W, 30.iii.1965 (H. W. Levi, MCZ); Uspallata, 32°35'S, 69°20'W, 7.iii.1983 (L. E. Peña, AMNH). *Neuquén*: Catan Lil, Charahuilla, 39°45'S,

70°37'W, 15.ii.1971 (O. de Ferrariis, AMNH); Cuba del Leon [?], 39°9'S, 70°53'W, 15.i.1975 (Maury, MACN); Lago Alumine, 38°55'S, 71°9'W, 15.i.1976 (O. de Ferrariis, AMNH); Zapala, 38°54'S, 70°4'W, 15.i.1958 (J. R. Navas, MACN). *Río Negro*: Cerro Alto [?], 41°8'S, 70°40'W (MACN); Co. Leones, source of Río Limay, 40°33'S, 70°26'W, 28.ii.1959 (J. R. Navas, MACN); El Bolson, 33°58'S, 71°31'W, 1.ii.1961 (A. Kovacs, AMNH), 17.x.1961 (Andor Kovacs, AMNH); El Bolson, 41°58'S, 71°35'W, 2.ii.1965 (Andor Kovacs, AMNH); General Roca, 39°3'S, 67°32'W, 15.ix.1964 (Bachmann, MEG). *Salta*: Maury [?], 24°40'S, 65°45'W, 15.i.1975 (MACN). *San Juan*: 10 km N Matagusanos, 31°10'S, 68°38'W, 13.i.1983 (L. E. Peña, AMNH). *San Luis*: INTA Experimental Station, E of Villa Mercedes, 33°40'S, 65°27'W, 8.xii.1967 (C. R. Ward, CAS). *Santa Cruz*: 2.4 km S Fitz Roy, 47°2'S, 67°15'W, 12.xii.1966 (E. I. Schlinger & M. E. Irwin, CAS). *Tucumán*: San Miguel de Tucumán, IML gardens, 26°49'S, 65°13'W, 19.xii.1979 (L. A. Stange, FSCA). *BRAZIL Mato Grosso*: Campo Grande, 20°27'S, 54°37'W, 7.ii.1952 (M. Alvarenga, MZSP). *CHILE Aconcagua*: W end tunnel, 85 km S Illapel, 32°49'S, 71°7'W, 29.xi.1950 (E. S. Ross & Michelbacher, CAS). *Aisén*: 8 km W Chile Chico, 46°33'S, 71°57'W, 22.xi.1966 (E. I. Schlinger & M. E. Irwin, CAS); Chile Chico, near lake, 46°33'S, 71°43'W, 21.xi.1966 (E. I. Schlinger & M. E. Irwin, CAS). *Antofagasta*: 6 km N Muelle de Piedra, N Taltal, 25°21'S, 70°30'W, 4.ii.1942 (Junius Bird, AMNH); Caleta Hueso Parado, Taltal, 25°22'S, 70°28'W, 1.ii.1941 (Junius Bird, AMNH); Cobija, 22°33'S, 70°16'W (ZMUC); Quebrada Papos, 25°2'S, 70°27'W, 3.ii.1989 (L. Stange, FSCA). *Araucanía*: Pemehue [?], 38°3'S, 71°43'W (L. E. Peña, IRSNB); Villarrica, 36°16'S, 72°13'W, 25.xi.1963 (G. F. Edmunds, AMNH). *Atacama*: 50–60 km S Copiapo, 27°51'S, 70°20'W, 24.viii.1966 (E. I. Schlinger & M. E. Irwin, CAS); Copiapo, 27°22'S, 70°20'W (Cartis, MNRJ); Río Copiapo, by the sea, 27°19'S, 70°56'W, 13.vi.1968 (L. E. Peña, MCZ). *Bío-Bío*: 4 km E road to Pinto, 36°42'S, 71°53'W, 4.i.1976 (B. Moreno, AMNH); Chillán, 36°36'S, 72°7'W, 2.i.1976 (G. Moreno, AMNH), 21.ii.1978 (G. Moreno, MCZ); Chillán, in cemetery, 36°36'S, 72°7'W, 8.xi.1976 (G. Moreno, AMNH); Cuesta de Quilmo, Chillán, 36°38'S, 72°12'W, 13.xi.1976 (G. Moreno, AMNH); El Abanico, 37°20'S, 71°31'W, 30.xii.1950 (E. S. Ross & Michelbacher, CAS); Las Lajuelas, 36°39'S, 72°8'W, 11.i.1976 (G. Moreno, AMNH). *Concepción*, 36°50'S, 73°3'W (L. E. Peña, IRSNB); Concepción: Salta de Río Laja, 37°13'S, 72°23'W, 30.i.1951 (E. S. Ross & Michelbacher, CAS); Ñuble: 50 km E San Carlos, 36°25'S, 71°6'W, 26.xii.1950 (E. S. Ross & Michelbacher, CAS); Ñuble: Cordillera de Chillán [?], 36°51'S, 71°24'W, 1.ii.1947 (L. E. Peña, IRSNB); Río Andalien, 36°44'S, 73°1'W, 25.iii.1979 (S. Gutierrez, MCZ). *Coquimbo*: 20 mi E La Serena, 29°54'S, 70°56'W, 3.vii.1950 (E. S. Ross & Michelbacher, CAS); 5 mi N Ovalle, 30°31'S, 71°12'W, 1.xii.1950 (E. S. Ross & Michelbacher, CAS); Baños

del Toro, 29°50'S, 70°2'W, 15.ii.1947 (L. E. Peña, IRSNB); Cerro Talinay, 30°50'29'S, 71°37'14'W, 29.xi.1961 (A. F. Archer, AMNH); Cuesta las Cardas, Ovalle Rd., 30°17'S, 71°16'W, 13.xi.1961 (R. Wagenknecht, AMNH); Hacienda Illapel, 31°36'S, 71°7'W, 3.xi.1954 (L. E. Peña, IRSNB), 19.x.1966 (E. I. Schlinger, M. E. Irwin, & L. E. Peña, CAS); Illapel: Salamanca: Fundo Quelén, 31°52'S, 70°52'W, 30.iv.1961 (A. F. Archer, AMNH); La Serena, 29°54'28'S, 71°15'15'W, 15.ii.1947 (L. E. Peña, IRSNB); Loma de Peñuelas, 6 km S La Serena, 29°57'S, 71°18'W, 28.xi.1961 (A. F. Archer, AMNH); Quilacán, 16 km E La Serena, 29°54'S, 71°5'W, 2.x.1961 (R. Wagenknecht, AMNH). *Los Lagos*: Purránque, 40°55'S, 73°10'W, 15.ii.1955 (Edwin Reed, AMNH); Río Bueno, 40°19'S, 72°55'W (L. E. Peña, IRSNB); Valdivia: Neltume, 39°48'S, 71°57'W, 23.xi.1988 (V. & B. Roth, CAS). *Malleco*: Angol, 37°45'S, 72°43'W, 29.i.1951 (E. S. Ross & Michelbacher, CAS). *Maule*: Linares, 35°51'S, 71°36'W (L. E. Peña, IRSNB), 15.i.1947 (L. E. Peña, IRSNB); Miraflores, Pedag. [?], 35°55'S, 71°39'W (Toro, AMNH). *O'Higgins*: Chépica, 34°44'S, 71°17'W, 15.xii.1947 (L. E. Peña, IRSNB). *Región Metropolitana*: 34 km W Santiago, 33°30'S, 71°25'W, 19.xii.1950 (E. S. Ross & Michelbacher, CAS); Batuco, nr. Santiago, 33°13'S, 70°47'W (Guil. Mann, AMNH); Lampa, 33°17'S, 70°54'W, 1.v.1979 (L. E. Peña, AMNH). *Santiago*: El Golf [?], 33°30'S, 71°25'W, 9.iv.1961 (A. F. Archer & J. Aros, AMNH); Santiago, 33°30'S, 71°25'W (L. E. Peña, IRSNB), 1.ii.1973 (W. C. Sedgwick, MCZ). *Talca*: 22 mi N Talca, 35°7'S, 71°40'W, 22.xii.1950 (CAS). *Valparaíso*: Concón, in cow farm, 32°55'S, 71°31'W, 4.iii.1962 (H. Morales, AMNH); La Cruz, 32°53'S, 71°16'W, 18.i.1973 (W. C. Sedgwick, MCZ); Llay-Llay, 32°51'S, 70°55'W, 20.i.1973 (W. C. Sedgwick, MCZ); Los Maitenes [?], 32°59'S, 71°15'W, 14.x.1954 (L. E. Peña, IRSNB); Quintay, 33°11'S, 71°42'W, 19.ii.1967 (E. I. Schlinger, CAS); Valparaíso, 33°2'S, 71°38'W (Edwin Reed, AMNH).

15. *Metepeira karkii* (Tullgren)

Figures 121–128, 303; Map 5

Araneus karkii Tullgren, 1901: 219, 259. Female holotype from Kark, Chile in the SMNH, examined. *Metepeira labyrinthica*:—Roewer, 1942: 865. Bonnet, 1957: 2821. Erroneous synonymy.

Description. Female from Río Gallegos, Santa Cruz Province, Argentina. Carapace reddish brown with white setae, light around eyes with lateral posterior extensions (Fig. 127). Legs light yellow, articles annulated distally. Femur I with row of three to four macrosetae on anterior side; one to four on anteroventral side. Dorsum covered with denser, longer, black and

white setae than in most species. Folium mostly white with brown speckles (Fig. 127). Venter brownish gray with wide white median line; pair of large white spots on either side of spiracle. A pair of thin white lines, parallel to and on either side of median line, sometimes connect to a pair of thinner transverse white lines: one just posterior to the epigynal groove, one just anterior to the spinnerets (Fig. 128). Sternum dark reddish brown (Fig. 128). Ratio of eye diameters: posterior medians and anterior medians 1.2, anterior laterals 1.4, posterior laterals 1.5. Anterior median eyes separated by 1.8 diameters, posterior median eyes by 1.0, anterior median eyes separated from anterior laterals by 4.2 diameters of anterior lateral eyes, lateral eyes separated by 0.3 their diameters. Total length 9.5 mm. Carapace 4 mm long, 3.4 wide. First femur 4 mm, patella and tibia 4.4, metatarsus 3.7, tarsus 1.2. Second patella and tibia 3.9 mm, third 2.5, fourth 3.8.

Male from Río Gallegos, Santa Cruz Province, Argentina. Carapace reddish brown with lighter eye region, lateral posterior extensions, and median arrowhead mark (Fig. 125). Legs light yellow, articles distally annulated reddish brown. Femur I with row of three to four macrosetae on anterior side; five to six on anteroventral side. Dorsal folium mostly white with brown speckles (Fig. 125). Venter and sternum as in female (Fig. 126). Ratio of eye diameters: posterior medians and anterior medians 1.0, anterior laterals 1.3, posterior laterals 1.2. Anterior median eyes separated by 1.7 diameters, posterior median eyes by 1.2, anterior median eyes separated from anterior laterals by 2.8 diameters of anterior lateral eyes, lateral eyes separated by 0.4 their diameters. Total length 5.7 mm. Carapace 2.8 mm long, 2 wide. First femur 4.3 mm, patella and tibia 4.3, metatarsus 4.1, tarsus 1.2. Second patella and tibia 3.5 mm, third 1.9, fourth 2.9.

Diagnosis. Females are easily separated from other species in the *M. nigriventris*

group by the thick posterior epigynal lobes (compare Fig. 123 with Fig. 119). The distal embolic apophysis does not protrude out from under the terminal apophysis (Fig. 124) as it does in *M. galathea*, *M. tarapaca*, and *M. nigriventris* (Figs. 87, 95, 119). The embolus of *M. karkii* differs from *M. calamuchita* by lacking the inwardly curved "dewlap" under the embolus (compare Fig. 121 with Fig. 103).

Variation. Average body length of 13 females examined 6.8 mm, range 5 to 8.2 mm. Average body length of five males examined 4.4 mm, range 2 to 5.3 mm. Dorsal folia vary from white with little contrast and indistinct fleur-de-lis to darker with more contrast and distinct fleur-de-lis.

Natural History. This species appears to be strongly seasonal: mature specimens have been collected between November and March (Fig. 303). Median elevation, 300 m. Spiders are found in pampas (treeless grassland).

Distribution. Lower altitudes in southern Argentina and Chile (Map 5).

Records Examined. ARGENTINA *Chubut*: Puerto Piramides, Peninsula Valdes, 42°34'S, 64°17'W, 12.xi.1988 (V. & B. Roth, CAS). *Neuquén*: Laguna Blanca, 39°3'S, 70°23'W, 15.iii.1959 (J. Nara, MACN); Zapala, 38°54'S, 70°4'W, 15.i.1958 (J. R. Navas, MACN); Zapala, Laguna Blanca, 38°54'S, 70°4'W, 15.i.1959 (J. R. Navas, MACN). *Río Negro*: Cerro Alto [?], 41°8'S, 70°40'W (MACN); Coronel Juan José Gomez, 39°2'S, 67°39'W, 15.xi.1945 (Ibarra Grasso, MLP); Ne-Luan, 41°25'S, 68°45'W (MACN). *Santa Cruz*: Laguna Calafate, Precordilfera [?], 50°55'S, 70°9'W, 22.i.1967 (P. San Martin, MCZ); Río Gallegos, 51°38'S, 69°13'W, 20.i.1967 (P. San Martin, MCZ). BOLIVIA *Santa Cruz*: Patagonia: Estancia Monte, cerca Río Coyby [?], 50°14'S, 68°55'W (B. Brown, AMNH). CHILE *Magallanes*: 4 km W Laguna Amarga, 50°59'S, 72°49'W, 8.xii.1966 (E. I. Schlinger & M. E. Irwin, CAS); Kark, 51°17'30"S, 72°32'30"W, 13.iii.1899 (E. Nordenskiöld, NRMS).

Metepeira compsa Group

The three species in the *M. compsa* group include *Metepeira compsa*, *Metepeira roraima*, and *Metepeira gressa*. Along with the *Metepeira nigriventris* group, this group has a median apophysis with teeth on the face of the keel. Unlike the *Mete-*

peira nigriventris group, this group has smaller, slimmer distal embolic apophyses that do not arch up over the embolus tip (compare Fig. 149 with Fig. 84). The openings to the epigynum have distinct, sclerotized edges and are clearly visible either as circles (Figs. 131, 134) or eye-shaped ovals (Figs. 143, 151).

**16. *Metepeira compsa* (Chamberlin)
Figures 129–140, 311; Map 8**

Aranea compsa Chamberlin, 1916: 252, fig. 6, ♀. Female holotype from Ollantaitambo, Cusco, Peru, in the MCZ, examined. Bonnet, 1955: 462.

Araneus labyrinthus:—Petrunkévitch, 1926: 27. Erroneous synonymy.

Metepeira virginensis Chamberlin and Ivie, 1942: 70, figs. 188–190, ♀, ♂. Female holotype from St. Thomas, U.S. Virgin Islands, in AMNH, examined. NEW SYNONYMY.

Metepeira latigyna Chamberlin and Ivie, 1942: 70, figs. 191, 192, ♀, ♂. Female holotype from Porto Alegre [Bahia], Brazil, in AMNH, examined. NEW SYNONYMY.

Metepeira compsa:—Chamberlin and Ivie, 1942: 71, figs. 193–195, ♂, ♂.

Metepeira labyrinthea:—Bryant, 1942: 346.

Metepeira perezi Archer, 1965: 132, figs. 14, 16, ♂, ♀. Male holotype from subexperiment station, Isabela, Puerto Rico, in AMNH, examined. Brignoli, 1983: 276. NEW SYNONYMY.

Metepeira vaurieorum Archer, 1965: 133, figs. 15, 19, ♂, ♀. Male holotype from Usine de Robert, Martinique, in AMNH, lost. Brignoli, 1983: 276. Lopez, 1993: 10, 11, figs. 1–4, 11, ♂. NEW SYNONYMY.

Note. Although the type for *M. vaurieorum* is lost, all examined records from Martinique (including ones from “Usine de Robert”) belong to *M. compsa*.

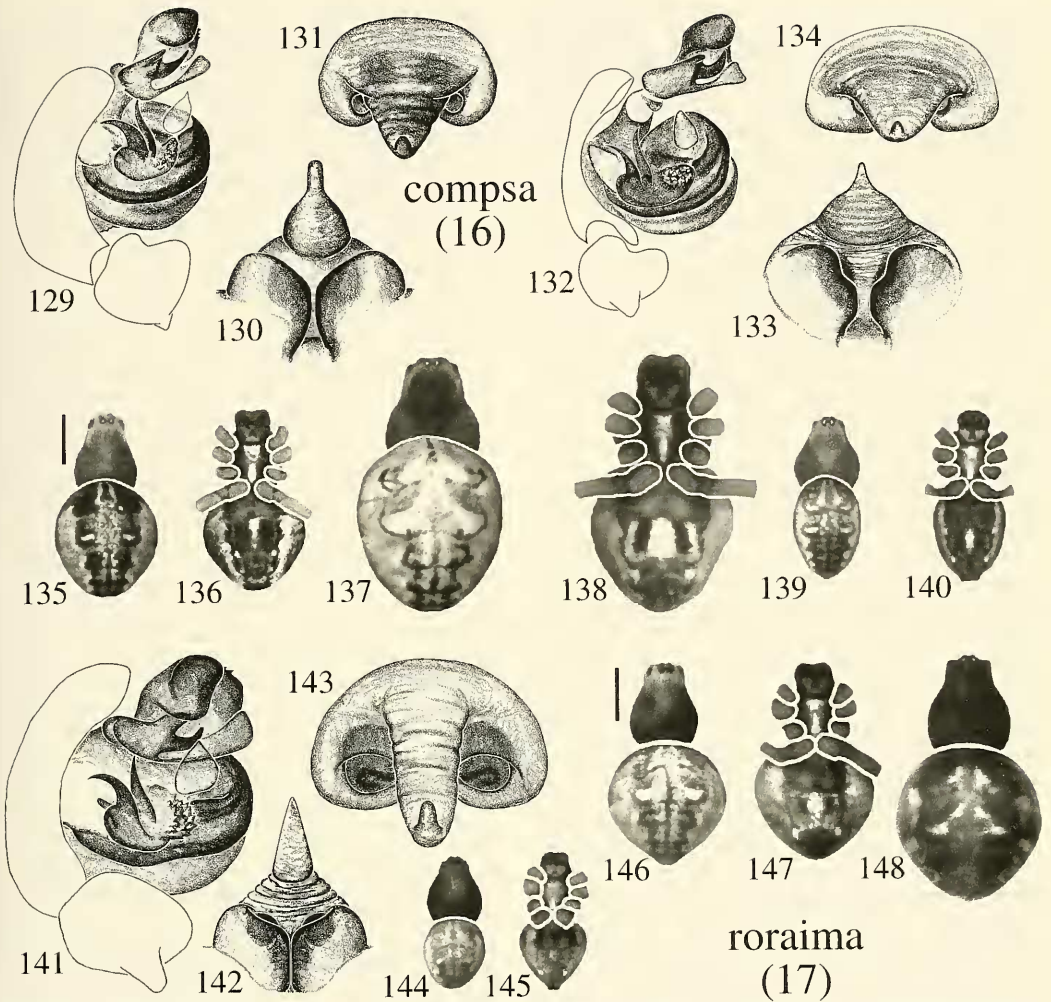
Description. Female from Savonet, Curaçao, Netherlands Antilles. Carapace light around eyes with lateral posterior extensions (Figs. 135, 137). Only tibia IV ringed. Femur I with row of four macrosetae on anterior side; two or three fine setae on anteroventral side. Dorsum of abdomen with usual *Metepeira* folium, though whiter than usual in some specimens (Figs. 135, 137). Venter with wide white median line flanked by two thin (Fig. 136) or wide (Fig. 138) white lines; pair of white spots on either side of spiracle. Sternum has wide median white line

widening anteriorly, sometimes broken (Figs. 136, 138). Ratio of eye diameters: posterior medians and anterior medians 1.0, anterior laterals 1.3, posterior laterals 1.2. Anterior median eyes separated by 1.3 diameters, posterior median eyes by 0.7, anterior median eyes separated from anterior laterals by 1.8 diameters of anterior lateral eyes, lateral eyes separated by 0.2 their diameters. Total length 3.9 mm. Carapace 1.8 mm long, 1.4 wide. First femur 1.9 mm, patella and tibia 1.9, metatarsus 1.5, tarsus 0.7. Second patella and tibia 1.7 mm, third 0.9, fourth 1.5.

Male from Savonet, Curaçao, Netherlands Antilles. Carapace light around eyes with lateral posterior extensions. Slightly lighter median triangular mark anterior to thoracic furrow (Fig. 139). Legs lightly ringed. Femur I with row of four macrosetae on anterior side, four on anteroventral side. Dorsum, venter, and sternum as in female (Figs. 139, 140). Ratio of eye diameters: posterior medians and anterior medians 1.0, anterior laterals 1.3, posterior laterals 1.2. Anterior median eyes separated by 1.3 diameters, posterior median eyes by 0.6, anterior median eyes separated from anterior laterals by 1.4 diameters of anterior lateral eyes, lateral eyes separated by 0.3 their diameters. Total length 3.6 mm. Carapace 1.8 mm long, 1.4 wide. First femur 2.7 mm, patella and tibia 2.8, metatarsus 2.4, tarsus 0.9. Second patella and tibia 2.3 mm, third 1.2, fourth 1.8.

Diagnosis. Unlike other species, the openings to the epigynum of *M. compsa* are small and almost perfectly round and sclerotized around the rim (Fig. 131). In Peruvian and Argentinean populations the scape can be extremely wide, often entirely covering a ventral view of the openings (Fig. 134). The distal embolic apophysis on the male palp extends straight from its base and parallel to the embolus tip (Figs. 129, 132), in contrast to those of other species in the *M. compsa* species group that lift away from the embolus tip (Figs. 141, 149).

Variation. Average body length of 22 fe-



Figures 129–140. *Metepeira compsa* (Chamberlin) (sp. 16 [129–131, 135, 136, 139, 140] 12°20'N, 69°7'W; [132] 4°30'S, 81°8'W; [133, 134] 4°51'S, 80°46'W; [137, 138] 17°5'N, 61°42'W). 129, male palpus, mesal. 130, epigynum, posterior. 131, epigynum, ventral. 132, male palpus, mesal. 133, epigynum, posterior. 134, epigynum, ventral. 135, female, dorsal. 136, female, ventral. 137, female, dorsal. 138, female, ventral. 139, male, dorsal. 140, male, ventral. Figures 141–148. *Metepeira roraima* new species (sp. 17 [141–147] 3°22'N, 60°19'W; [148] 3°21'N, 76°33'W). 141, male palpus, mesal. 142, epigynum, posterior. 143, epigynum, ventral. 144, male, dorsal. 145, male, ventral. 146, female, dorsal. 147, female, ventral. 148, female, dorsal.

Scale bars: dorsum and venter figures 1.0 mm.

males examined 5 mm, range 3.5 to 7.3 mm. Average body length of 18 males examined 3.6 mm, range 2.4 to 4.7 mm. Enormous variation in the shape of the scape can be seen in this species: populations in the Caribbean and northeastern South America have a narrow scape (Fig. 131), whereas populations in Argentina

and Peru have a thick scape (Fig. 134). Somewhat less consistently parallel differences can be seen in the shape of the median apophysis: flagella are centered in Caribbean and northeastern South America (Fig. 129) but shifted to the left in Argentina and Peru (Fig. 132). Further subtle differences appear in the shape of the em-

bolus tip and embolus arm (compare Fig. 129 with Fig. 132). These male and female genital differences are not sufficiently consistent to provide solid evidence for speciation; thus, these populations will be treated as one species.

Natural History. Mature specimens have been collected throughout the year (Fig. 311). Altitudes range from just above sea level (for Caribbean and eastern South American localities) to 4,000 m (for Peruvian localities). Spiders have been found in everything from second growth mixed exotics (e.g., mango, citrus, banana) and mangroves to grasses and semidesert chaparral.

Distribution. Puerto Rico to northern Argentina, but absent from the Amazon (Map 8).

Records Examined. ARGENTINA Buenos Aires: Punta Lara, 34°49'S, 57°59'W, 15.ii.1941 (F. Moneos, MACN). Chaco: Basail, 27°52'S, 59°18'W, 18.iv.1942 (MACN). Corrientes: Paso de la Patria, 27°19'S, 58°35'W, 15.i.1966 (M. E. Galiano, MEG). Entre Ríos: Paraná, 31°44'S, 60°32'W (Rosenzwaig, MLP); Salto Grande, 31°13'S, 57°56'W, 15.iii.1964 (M. E. Galiano, MEG). Misiones: Posadas, 27°23'S, 55°53'W, 15.ix.1963 (M. E. Galiano, MEG). Neuquén: Piedra del Aguila, 40°3'S, 70°5'W, 18.vii.1978 (Misión Científica Danesa, ZMUC). Santa Fé: Tostado, 29°14'S, 61°46'W (A. Giai, MACN). BOLIVIA La Paz: Apolo, 14°43'S, 68°31'W, 10.viii.1989 (L. E. Peña, AMNH). BRAZIL Bahia: Arquipélago dos Abrolhos, 17°40'S, 38°50'W, 28.xii.1887 (U.S.F.C., Voy. of Albatross, USNM); Parque Ondina, Salvador, 12°59'S, 38°31'W, 25.vii.1962 (A. F. Archer, AMNH); Porto Alegre, 18°5'S, 39°34'W (AMNH). Minas Gerais: Pedra Azul, 16°1'S, 41°16'W, 15.xii.1970 (F. M. Oliveira, AMNH). Pernambuco: Pernambuco [?], 8°3'S, 34°54'W, 12.iii.1927 (SMF), 8.iii.1955 (SMF). Rio de Janeiro: Lagomar [?], Macae, near sea, 22°23'S, 41°47'W, 17.vii.1986 (R. L. C. Baptista, MZSP). Rio Grande do Sul: Montenegro, 29°42'S, 51°28'W, 3.xi.1977 (E. H. Buckup, MCN); Rambo [?], 30°4'0"S, 51°11'W (MNRJ); Sao Leopoldo, 29°46'S, 51°9'W, 14.x.1965 (Celia Valle, MZSP). São Paulo: Rubião, Jr. [?], Botucatu, 22°52'S, 48°26'W, 25.iv.1988 (R. L. C. Baptista, MZSP); Sao Paulo, Guarujá, 24°0'S, 46°16'W, 24.vii.1983 (R. Sievers, AMNH). BRITISH WEST INDIES Anegada: 18°45'N, 64°20'W, 12.xi.1966 (Harry Beatty, AMNH); center, nr. salt pond, 18°45'N, 64°20'W, 4.vi.1966 (Island Project Staff, Univ. of Puerto Rico, AMNH); West end, 18°45'N, 64°22'W, 4.vi.1966 (Island Project Staff, Univ. of Puerto Rico, AMNH); Anegada Settlement: 18°45'N, 64°20'W, 5.vi.1966 (Island Project Staff, Univ. of

Puerto Rico, AMNH). Antigua: Coolidge Airport, 17°6'N, 61°51'W, 15.xi.1967 (N. L. H. Krauss, AMNH); Devil's Bridge, 17°5'N, 61°42'W, 30.vi.1963 (Rick & E. N. Kjellesvig-Waering, AMNH); Jolly Beach, 17°4'N, 61°53'W, 20.ix.1963 (E. N. Kjellesvig-Waering, AMNH); Lignum Vitae Bay: Jolly Beach [?], 17°4'N, 61°53'W, 19.vi.1968 (E. N. Kjellesvig-Waering, AMNH); Redonda Island, from webs spun between boulders on beach, 16°55'N, 62°19'W, 10.iv.1956 (J. F. G. Clarke, USNM); Reeds Point, nr. Jolly Beach, 17°4'N, 61°53'W, 2.vii.1963 (E. N. Kjellesvig-Waering, AMNH); Saint John's, 17°6'N, 61°51'W, 15.viii.1967 (N. L. H. Krauss, AMNH), 15.xii.1967 (N. L. H. Krauss, AMNH). Dead Man's Chest [?]: 18°22'N, 64°34'W, 26.v.1966 (Island Project Staff, Univ. of Puerto Rico, AMNH). East Seal Dog: 18°30'N, 64°25'W, 7.vi.1966 (Island Project Staff, Univ. of Puerto Rico, AMNH). George Dog Island: 18°30'N, 64°27'W, 7.vi.1966 (Island Project Staff, Univ. of Puerto Rico, AMNH); 4 mi W Virgin Gorda Isl, high on dry cliffs, 18°30'N, 64°27'W, 25.iii.1979 (K. Johnson, AMNH). Ginger Island: 18°24'N, 64°28'W, 25.v.1966 (Island Project Staff, Univ. of Puerto Rico, AMNH). Great Dog: 18°29'N, 64°27'W, 7.vi.1966 (Island Project Staff, Univ. of Puerto Rico, AMNH). Green Cay, near Tortola: 18°27'N, 64°42'30"W, 14.viii.1965 (Island Project Staff, Univ. of Puerto Rico, AMNH). Island O. near Anegada Settlement: 18°45'N, 64°20'W, 5.vi.1966 (Island Project Staff, Univ. of Puerto Rico, AMNH). Island R. near Anegada Settlement: 18°45'N, 64°20'W, 4.vi.1966 (Island Project Staff, Univ. of Puerto Rico, AMNH). Jost Van Dyke: 18°28'N, 64°45'W, 30.viii.1965 (H. Heatwole, R. Levins & F. MacKenzie, AMNH). Large mangrove patch nr. Settlement Anegado: 18°45'N, 64°20'W [?], 5.vi.1966 (Island Project Staff, Univ. of Puerto Rico, AMNH). Little Camanoe: 18°28'N, 64°33'W, 25.v.1966 (Island Project Staff, Univ. of Puerto Rico, AMNH). Little Jost Van Dyke: 18°27'N, 64°43'W, 27.vii.1965 (Island Project Staff, Univ. of Puerto Rico, AMNH). Little Tobago: 18°26'N, 64°51'W, 4.iv.1966 (Island Project Staff, Univ. of Puerto Rico, AMNH). Montserrat: Gage's Soufrière [?], 16°43'N, 62°10'W, 28.vii.1972 (N. L. H. Krauss, AMNH); Plymouth, 16°42'N, 62°13'W, 15.xi.1967 (N. L. H. Krauss, AMNH). Necker Island: 18°33'N, 64°21'W, 6.vi.1966 (Island Project Staff, Univ. of Puerto Rico, AMNH). nr. Anegada Settlement: Byer's Bache [?], 18°45'N, 64°20'W, 5.vi.1966 (Island Project Staff, Univ. of Puerto Rico, AMNH). Peter Island: 18°22'N, 64°35'W, 6.vii.1965 (Island Project Staff, Univ. of Puerto Rico, AMNH), 12.v.1966 (Percy Chubb, AMNH). Prickly Pear Island: 17°10'N, 61°48'W, 6.vi.1966 (Island Project Staff, Univ. of Puerto Rico, AMNH). Saint Christopher Island: Basseterre, 17°18'N, 62°43'W, 6.ii.1968 (B. Malkin, AMNH). Salt Island: 18°23'N, 64°31'W, 24.v.1966 (Island Project Staff, Univ. of Puerto Rico, AMNH). Sandy Key: near Tortola, 18°13'N, 63°7'W, 31.viii.1965 (H. & A. Heatwole, AMNH). Tobago Island: 18°27'N, 64°48'W, 2.iv.1966 (Island Project

Staff, Univ. of Puerto Rico, AMNH). *Tortola*: 18°27'N, 64°36'W, S.vii.1958 (A. F. Archer, C. Hel-sley, & M. Sanderson, AMNH); Beef Island, 18°27'N, 64°31'W, 21.vii.1965 (H. Heatwole, R. Levins & F. MacKenzie, AMNH); Greater Camanoe Isl, 18°29'N, 64°38'W, 1.vii.1965 (Island Project Staff, Univ. of Puerto Rico, AMNH); Little Thatch Island, 18°23'N, 64°42'W, 16.viii.1965 (Island Project Staff, Univ. of Puerto Rico, AMNH); Long Bay Estate, 18°24'N, 64°41'W, 24.vii.1965 (Island Project Staff, Univ. of Puerto Rico, AMNH); Marina Key [?], 18°27'N, 64°36'W, 4.vii.1965 (H. Heatwole & R. Levins, AMNH); Prospect Reef, S Roadtown, 18°25'N, 64°38'W, 23.iii.1979 (K. Johnson, AMNH), 31.iii.1979 (K. Johnson, AMNH); Road to town, 18°27'N, 64°36'W, 15.vii.1972 (N. L. H. Krauss, AMNH); Sandy Spit [?], 18°27'N, 64°36'W, 14.viii.1965 (Island Project Staff, Univ. of Puerto Rico, AMNH). *Tortola Island*: 18°27'N, 64°36'W, 15.vii.1965 (Island Project Staff, Univ. of Puerto Rico, AMNH). *Virgin Gorda*: 18°30'N, 64°24'W, 15.xi.1966 (Harry Beatty, AMNH); Baths & Devil's Bay, 18°26'N, 64°27'W, 25.vi.1966 (Island Project Staff, Univ. of Puerto Rico, AMNH); Cooper Mine Trail, 18°26'N, 64°26'W, 25.vi.1966 (Island Project Staff, Univ. of Puerto Rico, AMNH); Savana Bay & Pond Bay, 18°28'N, 64°25'W, 27.vi.1966 (Island Project Staff, Univ. of Puerto Rico, AMNH); Trellis Bay (W end of island), nr. harbor, 18°27'N, 64°26'W, 27.iii.1979 (K. Johnson, AMNH); Virgin Gorda Mountain, 18°30'N, 64°24'W, 26.vi.1966 (Island Project Staff, Univ. of Puerto Rico, AMNH). *Virgin Islands Area*: Island Q [?], 18°45'N, 64°20'W, 5.vi.1966 (Island Project Staff, Univ. of Puerto Rico, AMNH). *West Seal Dog Island*: 18°29'N, 64°28'W, 7.vi.1966 (Island Project Staff, Univ. of Puerto Rico, AMNH). CHILE *Tarapaca*: Arica, 18°29'S, 70°20'W, 28.i.1973 (W. C. Sedgwick, MCZ); Azapa Arica, 18°31'S, 70°11'W, 9.xi.1955 (L. E. Peña, IRSNB); Lluta, 18°24'S, 70°19'W, 12.xi.1955 (L. E. Peña, IRSNB); Río Lluta, 18°24'S, 70°19'W, 12.xi.1955 (L. E. Peña, IRSNB); Sobraya, 18°32'S, 70°9'W, 10.xi.1955 (L. E. Peña, IRSNB); Taltape, Camarones Valley, 18°59'S, 69°47'W, 29.i.1973 (MCZ). COLOMBIA *Magdalena*: Cabaña "Villa Culebra," 10 km E Station Marta, 11°12'N, 74°7'W, 15.x.1985 (H.-G. Müller, SMF); Casajera [?], 11°0'N, 74°15'W, 1.i.1974 (J. A. Kochalka, JAK); Cienaga, 11°1'N, 74°15'W, 30.i.1974 (J. A. Kochalka, JAK); Gaira, 11°11'N, 74°13'W, 15.xii.1975 (W. Eberhard, MCZ). DOMINICAN REPUBLIC *Barahona*: Patos, 10°38'N, 61°52'W, 24.ix.1944 (R. H. Montgomery, AMNH). FRENCH WEST INDIES *Guadeloupe*: Deshaies, 16°18'N, 61°48'W, 28.vi.1960 (C. & P. Vaurie, AMNH); Domaine Duclos [?], 16°16'N, 61°31'W, 25.vi.1960 (C. & P. Vaurie, AMNH), 15.vii.1960 (C. & P. Vaurie, AMNH); Marie-Galante, in citrus, 15°56'N, 61°16'W, 15.iii.1977 (W. H. Whitcomb, FSCA); Pointe-à-Pitre, Îlet à Boissard, 16°14'N, 61°34'W, 26.vi.1960 (C. & P. Vaurie, AMNH); Terre-de-Haut, Les Saintes, 15°58'N, 61°35'W, 2.vii.1960 (C. & P. Vaurie, AMNH). *Martinique*: Ansemitan [?],

Trois-Îlets, 14°33'N, 61°2'W, 10.vi.1960 (C. & P. Vaurie, AMNH); Diamant, 14°29'N, 61°2'W, 17.vi.1960 (C. & P. Vaurie, AMNH), 18.vi.1966 (C. & P. Vaurie, AMNH); Fort de France, 14°36'N, 61°5'W, 15.xii.1950 (N. L. H. Krauss, MCZ); Pointe Ferret, La Caravelle, 14°45'N, 60°54'W, 19.vi.1960 (C. & P. Vaurie, AMNH); Sainte-Anne, 14°26'N, 60°53'W, 20.vi.1966 (C. & P. Vaurie, AMNH); Usine de Robert [?], 14°41'N, 60°57'W, 16.vi.1960 (C. & P. Vaurie, AMNH). GRENADA nr. *Saint Georges*: 12°3'N, 61°45'W, 3.vi.1950 (Leo Isaacs, AMNH). NETHERLAND ANTILLES *Bonaire*: Red Pond [?], 12°12'N, 68°15'W, 3.i.1968 (B. Malkin, AMNH). *Curaçao*: 12°11'N, 68°58'W, 13.i.1968 (B. Malkin, AMNH); Fuik (Oostpunt), muddauber nests, 12°4'N, 68°49'W, 20.xii.1962 (H. W. Levi & B. de Jong, MCZ); Groot Sint Joris, plantation, 12°14'N, 69°3'W, 22.xii.1962 (H. W. Levi & B. de Jong, MCZ); Groote Berg, 12°11'N, 69°0'W, 19.xii.1962 (H. W. & L. Levi, MCZ); Hato, 12°11'N, 68°58'W, 28.xii.1967 (B. Malkin, AMNH), 7.i.1968 (B. Malkin, AMNH); Piscadera Baai, 12°8'N, 68°59'W, 18.xii.1962 (H. W. Levi, MCZ), 20.xii.1962 (H. W. Levi, MCZ); Savonet; shady ravine, 12°20'N, 69°7'W, 28.xii.1962 (H. W. Levi, MCZ); SE of airport, 12°10'N, 68°54'W, 20.xii.1962 (H. W. Levi & B. de Jong, MCZ); Siberië, 12°14'N, 69°3'W, 25.xii.1962 (H. W. Levi, MCZ); Sint Jan, 12°15'N, 69°6'W, 25.xii.1962 (H. W. Levi & B. de Jong, MCZ); Willemstad, Jewish Cemetery, 12°7'N, 68°57'W, 24.xii.1962 (H. W. Levi, MCZ). *Sint Eustatius*: Oranjestad, 17°29'N, 62°59'W, 18.i.1968 (B. Malkin, AMNH). *Sint Maarten*: nr. Juliana Airport [?], 18°4'N, 63°4'W, 24.ii.1965 (H. Heatwole & F. MacKenzie, AMNH). PARAGUAY *Alto Paraná*: Taguarazaya [?], 25°30'S, 54°50'W (AMNH). PERU *Ancash*: Huaraz, 9°32'S, 77°32'W, 6.xii.1980 (C. Gold, CAS). *Apurimac*: 35 mi E Abancay, 13°38'S, 72°22'W, 5.iii.1951 (E. S. Ross & Michelbacher, CAS); 40 mi E Abancay, 13°38'S, 72°20'W, 4.iii.1951 (E. S. Ross & Michelbacher, CAS); Abancay, 13°38'2"S, 72°52'53"W, 6.iii.1951 (E. S. Ross & Michelbacher, CAS). *Cajamarca*: Jaen, 5°42'34"S, 78°48'32"W, 17.v.1967 (A. F. Archer, AMNH). *Cusco*: 40 mi W Cusco, 13°32'S, 72°33'W, 5.iii.1951 (E. S. Ross & Michelbacher, CAS); Hacienda Urco, near Calea, 13°22'S, 71°54'W, 19.ix.1939 (Karl P. Schmidt, AMNH); Huacerpay [?], 13°37'S, 72°13'W, 10.ix.1993 (J. Ochoa Camara, MCZ); Ollantaitambo, 13°15'17"S, 72°15'48"W, 15.vii.1911 (Yale Peruvian Expedition, AMNH), 15.xii.1980 (C. Gold, CAS); Pisac, 13°25'21"S, 71°50'48"W, 13.xii.1980 (C. Gold, CAS); Urubamba, 13°18'28"S, 72°6'53"W, 15.i.1965 (Carrasco, MCZ), 18.ii.1965 (H. W. Levi, MCZ), 6.viii.1987 (D. Silva, MUSM). *Huanuco*: Huanuco, 9°55'S, 76°14'W, 6.x.1946 (J. C. Pallister, AMNH). *Ica*: km 367 between Ica and Nazca, sandy semidesert, 14°24'S, 75°23'W, 22.i.1952 (W. Weyrauch, CAS); Nazca, 14°50'S, 74°57'W, 15.iv.1951 (P. Aguilar, CAS). *Piura*: Cerro Prieto, La Brea, 4°41'S, 81°6'W (CAS); Mallares, 4°51'S, 80°46'W, 8.vi.1941 (H. E. F. & D. E. F., CAS), 13.vii.1941 (H. E. F. & D. E. F.,

- CAS); N of Negritos, Pariñas Valley, 4°41'S, 81°18'W, 9.x.1938 (D. L. & H. E. Frizzell, CAS); nr. Negritos, 4°42'S, 81°18'W, 5.iii.1939 (H. E. F. CAS); nr. Sechura, 5°33'S, 80°51'W, 4.xi.1941 (D. L. F. CAS); Negritos, 4°42'S, 81°18'W, 15.xi.1934 (H. E. F. CAS), 15.iii.1941 (H. E. F. CAS); Pariñas, 4°30'S, 81°8'W, 7.v.1939 (D. L. & H. E. Frizzell, CAS), 31.v.1939 (D. L. & H. E. Frizzell, CAS), 15.x.1939 (D. L. & H. E. Frizzell, CAS); Pariñas Valley, 4°30'S, 81°8'W, 6.iii.1939 (D. L. & H. E. Frizzell, CAS), 8.iv.1939 (D. L. & H. E. Frizzell, CAS); Portachuelo, 4°59'S, 79°54'W, 29.iv.1939 (M. H. & H. E. Frizzell, CAS); Quebrada Mogollon, 4°32'S, 81°4'W, 30.iv.1939 (D. L. & H. E. Frizzell, CAS), 11.vi.1939 (D. L. & H. E. Frizzell, CAS); Río Chira Valley, N of Amotape, 4°53'S, 81°1'W, 13.xi.1938 (D. L. & H. E. Frizzell, CAS); S of Sechura, 5°33'S, 80°51'W, 25.x.1941 (D. L. F. CAS); San Lorenzo [?], Zona Alta Este Herrera, 5°4'S, 79°47'W, 12.iv.1969 (P. Aguilar, MCZ); Sullaña, 4°53'S, 80°41'W, 8.x.1939 (D. L. & H. E. Frizzell, CAS), 5.x.1941 (D. L. & H. E. Frizzell, CAS). *Tumbes*: 34 km E, 25 km N Punta Pariñas, 4°18'S, 80°51'W, 1.i.1939 (D. L. & H. E. Frizzell, CAS). SAINT LUCIA *Castries*: 14°1'N, 61°0'W, 28.vii.1963 (E. N. Kjellesvig-Waering, AMNH). TRINIDAD & TOBAGO *Tobago Island*: Buccoo Bay, 11°10'N, 60°48'W, 15.viii.1965 (E. N. Kjellesvig-Waering, AMNH); Guayaguayare Point, 10°8'N, 61°2'W, 14.ix.1963 (E. N. Kjellesvig-Waering, AMNH); Pigeon Point, 11°10'N, 60°50'W, 18.viii.1937 (E. D., MCZ); Salybia Bay, by shore, 10°42'N, 61°2'W, 15.ii.1972 (J. A. L. Cooke, MCZ); Toco, 10°50'N, 60°57'W, 19.iv.1964 (Erik N. Kjellesvig-Waering, AMNH). *Trinidad*: Gasparee, 10°46'N, 61°19'W, 3.xi.1944 (R. Montgomery, AMNH). URUGUAY *Colonia*: Punta Gorda [?], 34°28'S, 57°51'W, 25.ii.1968 (R. Capocasale & L. Bruno, CAS). USA *Puerto Rico*: Algodones Key, 18°12'N, 65°41'W, 15.x.1964 (H. Heatwole, R. Levins & F. MacKenzie, AMNH); Bañeros [?] Guajataca, 18°21'N, 66°55'W, 4.vii.1958 (A. F. Archer, AMNH); Baños de Coamo, 17°59'N, 67°3'W, 2.iv.1990 (H. W. & L. Levi, MCZ), 3.iv.1990 (H. W. & L. Levi, MCZ); Barranquitas, 18°11'N, 66°18'W, 28.xii.1977 (J. Coddington, USNM); below Quebradillas along old RR track, 18°28'N, 66°56'W, 30.iii.1989 (H. W. & L. Levi, MCZ); Cabeza de Perro Island, 18°15'N, 65°35'W, 16.i.1965 (H. Heatwole & F. MacKenzie, AMNH); Cayo Don Luis, 17°57'N, 66°58'W, 12.i.1966 (Island Project Staff, Univ. of Puerto Rico, AMNH); Cayo Norte, off Culebra, 18°20'N, 65°15'W, 14.iv.1965 (H. Heatwole & F. MacKenzie, AMNH); Cayo Piñerito, 18°15'N, 65°36'W, 24.ix.1964 (H. Heatwole & F. MacKenzie, AMNH); Channel at Culebra, Isla del Diablo, 18°23'N, 65°40'W, 12.viii.1965 (Island Project Staff, Univ. of Puerto Rico, AMNH); Cuevas de los Alfaros, Barrio Mora, 18°29'N, 67°1'W, 20.vii.1958 (A. F. Archer & Rolle, AMNH); Culebra Island, 18°19'N, 65°17'W, 19.vii.1965 (F. MacKenzie, AMNH); Culebra, near Dewey, 18°18'N, 65°18'W, 10.viii.1965 (Island Project Staff, Univ. of Puerto Rico, AMNH); Culebrita Island, 18°19'N, 65°14'W, 15.iv.1965 (H. Heatwole & F. MacKenzie, AMNH), 11.viii.1965 (Island Project Staff, Univ. of Puerto Rico, AMNH); Desecheo Is., 18°23'N, 67°29'W, 19.ii.1914 (AMNH); Desecheo Island, 18°23'N, 67°29'W, 28.v.1965 (H. Heatwole, R. Levins & F. MacKenzie, AMNH); Faro de Cabo Rojo, 18°5'N, 67°9'W, 13.iii.1961 (F. Rolle, AMNH); Frank Key, Isl. #13 nr. La Parguera area, 17°58'N, 67°3'W, 14.i.1966 (Island Project Staff, Univ. of Puerto Rico, MCZ); Heatwole Island, off Culebrita, 18°19'N, 65°13'W, 14.iv.1965 (H. Heatwole & F. MacKenzie, AMNH); Hormigueros, 18°9'N, 67°8'W, 16.ii.1962 (Aida Velez, AMNH), 11.iii.1962 (Aida Velez, AMNH), 19.iii.1962 (Aida Velez, AMNH); Isabela, subexperiment station, 18°30'N, 67°1'W, 17.viii.1957 (A. F. Archer, AMNH); Jayuya, coffee plantation, 18°13'N, 66°37'W, 23.iii.1986 (H. W. & L. Levi, MCZ); Juana Díaz, 18°3'N, 66°31'W, 7.xi.1971 (J. E. Carico, JEC); Levin's Rock [?], 18°12'N, 65°41'W, 15.x.1964 (H. Heatwole, R. Levins & F. MacKenzie, AMNH); Loma Tinaja [?], S of Laguna Cartagena, 17°59'N, 67°6'W, 5.vii.1958 (A. F. Archer & M. Sanderson, AMNH); Luquillo, near beach, 18°23'N, 65°44'W, 24.i.1932 (A. S. Mills, AMNH), 24.xii.1985 (V. & B. Roth, CAS), 27.iii.1988 (H. W. & L. Levi, MCZ); Mayagüez, 18°12'N, 67°9'W, 15.vii.1958 (A. F. Archer, MCZ); Mayagüez, 5 km N university campus, 18°12'N, 67°9'W, 5.i.1964 (MCZ); Mayagüez: Las Mesas, 18°11'N, 67°6'W, 20.xi.1960 (F. Rolle, AMNH); Mayagüez, university farm N university campus, 18°12'N, 67°9'W, 7.ii.1964 (MCZ); McKenzie Key, Key #3 [?], 18°12'N, 65°41'W, 29.x.1964 (H. Heatwole, R. Levins & F. MacKenzie, AMNH); Mona Island, Serrallés, 18°5'N, 67°54'W [?], 7.iv.1944 (Beatty, MCZ); Muertos Island, beating bushes, 17°54'N, 66°32'W, 28.v.1959 (Jordan & Martorell, AMNH); Muertos Island, mud nests of Sceliphron caementarium, 17°54'N, 66°32'W, 27.v.1959 (Medina & Martorell, AMNH); N slope Tinaja, nr. Cartagena Lagoon, beating and sweeping, 18°23'N, 67°10'W, 5.vii.1958 (M. W. Sanderson, AMNH); Palominos, 18°20'N, 65°34'W, 16.vi.1965 (Island Project Staff, Univ. of Puerto Rico, AMNH); Palomino Island, 18°21'N, 65°34'W, 7.xi.1964 (H. Heatwole & F. MacKenzie, AMNH); Parguera, 17°59'N, 67°3'W, 25.iii.1990 (H. W. & L. Levi, MCZ); Patillas, 18°0'N, 66°1'W, 3.iv.1931 (Mills & Leonard, AMNH); Pico Atalaya, Rte. 2, nr. Añasco, 18°18'N, 67°11'W, 3.vii.1958 (M. W. Sanderson, AMNH); Piñeros Island, 18°15'N, 65°35'W, 24.ix.1964 (H. Heatwole & F. MacKenzie, AMNH); Playa de Humacao, around hotel, 18°29'N, 66°56'W, 30.iii.1989 (H. W. & L. Levi, MCZ); Ratonos Island, 17°56'N, 66°17'W, 19.xi.1964 (H. Heatwole & R. Levins, AMNH); Romero III [?], 17°57'N, 67°0'W, 13.i.1966 (Island Project Staff, Univ. of Puerto Rico, AMNH); Rubianes, Caimito Bajo [?], Cord. Jaicoa, 18°26'N, 67°8'W, 19.vii.1958 (A. F. Archer & Rolle, AMNH); Santurce, 18°27'N, 66°4'W, 28.iii.1931 (A. S. Mills, AMNH); South of Corozo, Cabo Rojo salt flats, edge of salt

ponds, 17°56'N, 67°11'W, 23.iii.1990 (H. W. & L. Levi, MCZ); Valle de Lajas, 18°1'N, 67°8'W, 3.vi.1958 (A. F. Archer, AMNH); xeric hills N of Guánica, 18°0'N, 66°55'W, 28.viii.1957 (A. F. Archer, AMNH); Zancudo Island (Isleta Marina), 18°20'N, 65°37'W, 2.xi.1964 (H. Heatwole & F. MacKenzie, AMNH). U.S. VIRGIN ISLANDS *Big Cockroach*: 18°24'N, 65°4'W, 7.vi.1966 (Island Project Staff, Univ. of Puerto Rico, AMNH). *Congo Cay*: 18°22'N, 64°48'W, 12.xi.1966 (Island Project Staff, Univ. of Puerto Rico, AMNH). *Grass Cay*: 18°22'N, 64°50'W, 12.xi.1966 (Univ. of Puerto Rico, AMNH). *Great Saint James Island*: 18°19'N, 64°50'W, 13.xi.1966 (Island Project Staff, Univ. of Puerto Rico, AMNH). *Hans Lollik Island*: 18°24'N, 64°55'W, 6.iv.1966 (Island Project Staff, Univ. of Puerto Rico, AMNH). *Little Cockroaches*: 18°25'N, 65°3'W, 7.vi.1966 (Island Project Staff, Univ. of Puerto Rico, AMNH). *Little Hans Lollik*: 18°25'N, 64°54'W, 5.iv.1966 (Island Project Staff, Univ. of Puerto Rico, AMNH). *Little Saint James Island*: 18°18'N, 64°50'W, 13.xi.1966 (Island Project Staff, Univ. of Puerto Rico, AMNH). *Mingo Cay*: 18°22'N, 64°49'W, 12.xi.1966 (Island Project Staff, Univ. of Puerto Rico, AMNH). *Saint John*: 18°20'N, 64°45'W, 9.iii.1925 (F. E. Lutz, AMNH), 11.vii.1958 (A. F. Archer & M. Sanderson, AMNH), 15.xii.1967 (N. L. H. Krauss, AMNH); Cruz Bay, 18°20'N, 64°48'W, 27.ii.1964 (A. M. Chickering, MCZ); nr. Cinnamon & Hart Bays on W half of island, 18°20'N, 64°46'W, 2.viii.1976 (D. E. & D. N. Rosen, AMNH). *Saint Thomas*: 18°24'N, 64°55'W, 24.ii.1925 (AMNH), 24.vii.1925 (A. Petrunkevitch, CAS), 24.xi.1925 (AMNH); Crown Mountain, 18°21'N, 64°58'W, 30.viii.1957 (A. F. Archer, AMNH), 7.vii.1958 (A. F. Archer, AMNH); Denmark Hill [?], 18°24'N, 66°55'W, 1.ix.1957 (A. F. Archer, AMNH); Flagstok Hill, Stumpy Bay, 18°22'N, 65°0'W, 9.vii.1958 (A. F. Archer, AMNH); Harman's, Charlotte Amalia, 18°21'N, 64°56'W, 2.ix.1957 (A. F. Archer & family, AMNH); Hassell Island, 18°20'N, 64°56'W, 1.ix.1957 (A. F. Archer, AMNH), 15.ii.1964 (A. M. Chickering, MCZ), 10.viii.1966 (M. L. Pres-sick, AMNH). *St. Croix*: Christiansted, 17°45'N, 64°42'W, 3.vi.1911 (AMNH), 15.i.1955 (A. M. Nadler, AMNH); East End, 17°45'N, 64°40'W, 15.xii.1965 (Island Project Staff, Univ. of Puerto Rico, AMNH); Green Key, 17°46'N, 64°40'W, 17.iv.1964 (H. Heatwole, MCZ); Mount Eagle, dryish forest, 17°46'N, 64°49'W, 15.xii.1965 (Island Project Staff, Univ. of Puerto Rico, AMNH); Protestant Cay, 17°45'N, 64°42'W, 18.iv.1964 (H. Heatwole, MCZ); St. Croix, 17°45'N, 64°54'W, 1.ix.1966 (Chickering, MCZ), 6.ix.1966 (Chickering, MCZ). VENEZUELA *Dependencias Federales*: Patos, 10°38'N, 61°52'W, 23.ix.1944 (R. H. Montgomery, AMNH). *Distrito Federal*: Punta Tanaguarena, in coastal bldg. & garden, 10°37'N, 66°48'W, 26.xii.1970 (W. B. Peck, CAS).

17. *Metepeira roraima* new species Figures 141–148, 316; Map 8

Holotype. Female from Rio Surumu, Roraima, Brazil, x.1966, M. Abrorenga, in MZSP. The specific name is a noun in apposition after the locality.

Description. Female holotype. Brown carapace; lighter around eyes (Fig. 146). Coxae, femora, tibiae, and patellae tan, lighter ventrally. Metatarsi, tarsi white. Femur I with row of three or four macrosetae on anterior side; none on anteroventral side. Dorsal folium with typical *Metepeira* fleur-de-lis pattern (Fig. 146). Venter of abdomen brown with wide white median line, flanked by thinner white lines that together form a T-shape posteriorly (Fig. 147). Pair of small white spots on either side of T-shape mark. Sternum brown with median white line (Fig. 147). Ratio of eye diameters: posterior medians and anterior medians 1.1, anterior laterals 1.5, posterior laterals 1.3. Anterior median eyes separated by 1.2 diameters, posterior median eyes by 0.6, anterior median eyes separated from anterior laterals by 1.9 diameters of anterior lateral eyes, lateral eyes separated by 0.1 their diameters. Total length 4 mm. Carapace 1.8 mm long, 1.4 wide. First femur 1.9 mm, patella and tibia 2.1, metatarsus 1.8, tarsus 0.7. Second patella and tibia 1.7 mm, third 1.0, fourth 1.6.

Male paratype from Rio Surumu, Roraima, Brazil. Carapace brown; lighter around eyes with median white mark (Fig. 144). Legs brown, white at base of femora. Femur I with row of four to five macrosetae on anterior side; four to five on anteroventral side. Dorsal folium, venter, and sternum as in female (Figs. 144, 145). Ratio of eye diameters: posterior medians and anterior medians 1.1, anterior laterals 1.6, posterior laterals 1.4. Anterior median eyes separated by 1.4 diameters, posterior median eyes by 0.6, anterior median eyes separated from anterior laterals by 1.6 diameters of anterior lateral eyes, lateral eyes separated by 0.2 their diameters. Total length 2.9 mm. Carapace 1.3 mm long, 1.1 wide. First femur 1.9 mm, patella and

tibia 2, metatarsus 1.6, tarsus 0.6. Second patella and tibia 1.5 mm, third 0.8, fourth 1.3.

Diagnosis. The epigynum of *M. roraima* differs from that of *M. compsa* by having oval openings (Fig. 143) instead of round openings (Figs. 131, 134); it differs from *M. gressa* by being more translucent and by having a narrower scape (compare Fig. 143 with Fig. 151). Unlike *M. gressa*, the embolus tip of *M. roraima* is more bent and the distal apophysis is as wide as the embolus tip (compare Fig. 141 with Fig. 149). Unlike *M. compsa*, the distal embolic apophysis projects away from the embolus tip (Fig. 141) instead of extending straight from the base and parallel to the embolus tip (Figs. 129, 132).

Variation. Average body length of eight females examined 5 mm, range 4 to 7 mm. Average body length of five males examined 3.1 mm, range 2.8 to 4 mm. Colombian specimens are much darker than those from northern Brazil and southern Guyana, suggesting the possibility that these populations represent separate cryptic species. In fact, the carapace on Colombian specimens is often jet black with the white marks on the dorsal folium much reduced (Fig. 148). However, there is little corresponding genitalic difference, especially among males; consequently, these populations are deemed to be conspecific.

Natural History. Mature *M. roraima* specimens from eastern South America have been collected in November and December; specimens from western South America have been collected between March and July (Fig. 316). Median elevation, 1,000 m.

Distribution. Western Colombia, northern Brazil, and southern Guyana (Map 8).

Records Examined. BRAZIL, *Roraima*: Rio Surumu, Jerrit Rio Branco [?], 3°22'N, 60°19'W, x.1966 (M. Abrorenga, MZSP). COLOMBIA, Valle del Cauca: Atuncela, 3°46'N, 76°42'W, 19.vii.1970 (W. Eberhard, MCZ); Cali, around house, 3°27'N, 76°31'W (W. Eberhard, MCZ); Palmira, 3°32'N, 76°17'W, 1.iii.1964 (Ballo, CAS); Rio Pance, below Buenos Ai-

res, 3°55'N, 76°8'W, 5.iv.1970 (W. Eberhard, MCZ); Rio Pance, near Cali., 3°21'N, 76°33'W, 8.v.1970 (W. Eberhard, MCZ), 8.vi.1970 (W. Eberhard, MCZ), 15.vi.1970 (W. Eberhard, MCZ), 23.vi.1970 (W. Eberhard, MCZ), 25.vi.1973 (W. Eberhard, MCZ). GUYANA *Upper Takutu*: Isherton, on lat. 2, 10 mi E Rupununi River, 2°19'N, 59°22'W, 15.xi.1937 (W. G. Hassler, AMNH).

18. *Metepeira gressa* (Keyserling) Figures 149–156, 300; Map 8

Epeira gressa Keyserling, 1892: 166, fig. 123, ♀. Five female syntypes from Taquara, Rio Grande do Sul, Brazil, in BMNH, examined. One specimen designated lectotype.

Epeira seditiosa Keyserling, 1893: 212, fig. 157, ♂. Male holotype from Rio Grande do Sul, Brazil, in BMNH, examined. NEW SYNONYMY.

Araneus gressus:—Petrunkévitch, 1911: 314. Roewer, 1942: 844. Bonnet, 1955: 511.

Araneus seditiosus:—Petrunkévitch, 1911: 314. Roewer, 1942: 852. Bonnet (1955: 592) erroneously suggests that Petrunkévitch (1911: 314) synonymized *Araneus scitulus* (Blackwall, 1863) with *Araneus seditiosus*.

Eustala seditiosa:—Mello-Leitão, 1943: 179. Erroneous transfer.

Metazygia gressa:—Mello-Leitão, 1943: 187. Erroneous transfer.

Metepeira gressa:—Levi, 1991: 179. Platnick, 1993: 449.

Metepeira seditiosa:—Levi, 1991: 180. Platnick, 1993: 449.

Note. Examination of voucher specimens of Viera suggest that in the behavioral studies of Viera (1986, 1989) and Viera and Costa (1988), the name "*Metepeira* sp. A" is, in fact, *M. gressa*.

Description. Female from Punta del Es-pinillo, Montevideo, Uruguay. Chelicerae brown, lighter on distal inside margins. Carapace brown; yellowish white across and just behind posterior eye row; median white line reaching thoracic furrow, sometimes thickened into arrow shape (Fig. 155). Proximal halves of femora, white; remainder black. Patellae black ventrally, white dorsally. Distal halves of tibiae, black; remainder white with black annulation. Femur I with row of four macrosetae on anterior side; none on antero-ventral side. Dorsal folium white fleur-de-lis pattern on black, margined with wavy white lines (Fig. 155). Venter black with short, wide, white median line; pair of small white spots on either side of spiracle

(Fig. 156). Sternum black with median white line, often broken (Fig. 156). Ratio of eye diameters: posterior medians and anterior medians 1.2, anterior laterals 1.3, posterior laterals 1.3. Anterior median eyes separated by 1.8 diameters, posterior median eyes by 1.0, anterior median eyes separated from anterior laterals by 2 diameters of anterior lateral eyes, lateral eyes separated by 0.2 their diameters. Total length 3.3 mm. Carapace 1.8 mm long, 1.4 wide. First femur 1.9 mm, patella and tibia 2, metatarsus 1.6, tarsus 0.7. Second patella and tibia 1.8 mm, third 1.1, fourth 1.6.

Male from Punta del Espinillo, Montevideo, Uruguay. Coloration of chelicerae and carapace as in female except median line brighter, thickened into arrow shape (Fig. 153). Leg coloration as in female. Femur I with row of four macrosetae on anterior side; five to six on anteroventral side. Dorsal folium, venter, and sternum as in female (Figs. 153, 154). Ratio of eye diameters: posterior medians and anterior medians 1.0, anterior laterals 1.5, posterior laterals 1.4. Anterior median eyes separated by 1.3 diameters, posterior median eyes by 0.8, anterior median eyes separated from anterior laterals by 1.9 diameters of anterior lateral eyes, lateral eyes separated by 0.3 their diameters. Total length 3 mm. Carapace 1.8 mm long, 1.3 wide. First femur 2.5 mm, patella and tibia 2.3, metatarsus 1.9, tarsus 0.9. Second patella and tibia 1.8 mm, third 1.1, fourth 1.6.

Diagnosis. The epigynum of *M. gressa* differs from that of *M. compsa* by having oval openings (Fig. 151) instead of round openings (Figs. 131, 134); it differs from *M. roraima* by being less translucent and by having a wider scape (compare Fig. 151 with Fig. 143). Unlike *M. roraima*, the embolus tip in *M. gressa* is not as bent, and the distal apophysis is thinner than the point on the embolus where it is attached (compare Fig. 149 with Fig. 141). Unlike *M. compsa*, the distal embolic apophysis projects away from the embolus tip (Fig. 149) instead of extending straight from the

base and parallel to the embolus tip (Figs. 129, 132).

Variation. Average body length of 14 females examined 4.8 mm, range 3.3 to 6.8 mm. Average body length of five males examined 3.4 mm, range 2.8 to 4.3 mm.

Natural History. In Uruguay, *M. gressa* live in small colonies of up to five individuals surrounding the inflorescences of *Eryngium* sp. (Viera and Costa, 1988). The number of sticky spirals (14 below the hub, 22 above the hub) and radii (c. 40) are the same irrespective of age; however the length and width of the web differ between juveniles (c. 6 and 5 cm, respectively) and adults (c. 9 and 7 cm, respectively) (Viera, 1992). Mature specimens are most often collected between September and March at low elevation (Fig. 300).

Distribution. Northern Argentina, Paraguay, and Uruguay (Map 8).

Records Examined. ARGENTINA Buenos Aires: Arrecifes, 34°3'S, 60°7'W, 17.i.1939 (Biraben, MLP); Boulogne, 34°30'S, 58°34'W, 15.x.1938 (Prosen, MLP); Colon [?], 33°53'29"S, 61°6'35"W, 20.ix.1944 (Torres, MLP); Moreno, 34°39'S, 58°48'W, 15.ii.1966 (Rossi and Maury, MACN); San Isidro, 34°27'S, 58°30'W, 15.xii.1937 (Peregra, MACN); San Miguel—San Fernando, 34°29'S, 58°39'W, 15.vii.1940 (F. Morrios, MACN); Sierra de la Ventana, 38°9'S, 61°48'W, 15.iii.1939 (S. H. Bavio, MACN), 15.xi.1954 (Fritz, MACN), 31.x.1969 (Carlos Grisolia, MCZ), 15.vii.1972 (Amarrilla, MACN); Tigre, 34°25'S, 58°34'W (J. M. Viana, MACN). Entre Ríos: Concepción del Uruguay, 32°29'0"S, 58°13'42"W, 4.i.1941 (Prosen, MLP); Salto Grande, 31°13'S, 57°56'W, 15.iii.1964 (M. E. Galiano, MEG). Santa Fé: Florencia Varelo [?], 28°2'S, 59°15'W, 15.xii.1939 (F. Morris, MACN). Tucumán: 30 km S Concepción, 27°36'S, 65°35'W, 16.i.1983 (L. E. Peña, AMNH). PARAGUAY Itapúa: San Luis, 27°6'S, 56°36'W, 15.x.1908 (AMNH). URUGUAY Canelones: Montevideo: Detras del Cerro, Camino de las tropas [?], 34°45'S, 56°10'W, 6.ii.1963 (R. Capocasale and L. Bruno, CAS). Colonia: Punta Gorda, [?], 34°28'S, 57°51'W, 25.ii.1968 (R. Capocasale and L. Bruno, CAS), 26.ii.1968 (R. Capocasale and L. Bruno, CAS). Maldonado: Colonia, Cerro de las Animas. Small stones in native forest, 34°46'S, 55°19'W, 30.x.1967 (P. San Martin, MCZ). Montevideo: Punta del Espinillo, 34°50'S, 56°26'W, 12.x.1983 (Carmen Viera, MCZ), 15.xii.1983 (Carmen Viera, CV). Treinta y Tres: Quebrada de los Cuervos, 33°10'S, 54°27'W, 27.x.1990 (Lopez, Perez, Viera, MCZ).

Metepeira incrassata Group

Species in the *M. incrassata* group all lack a keel on the median apophysis. Males have a distal embolic apophysis that either projects toward the embolus tip (e.g., Fig. 157), forms a sharp corner but does not actually project forward (e.g., Fig. 185), or forms a smoother, rounded, and gradual corner (e.g., Figs. 192, 206). The *M. incrassata* species group includes *Metepeira maya*, *Metepeira inca*, *Metepeira gosoga*, *Metepeira olmec*, *Metepeira comanche*, *Metepeira pimungan*, *Metepeira triangularis*, *Metepeira arizonica*, *Metepeira atas-cadero*, and *Metepeira incrassata*.

19. *Metepeira maya* new species

Figures 157–163, 317; Map 14

Holotype. Male from North Bay, Twin Cays, Stann Creek District, Belize, 14.iii.1986, P. Siervald, in USNM. The specific name is a noun in apposition after the Indian people of southern Mexico and Central America.

Description. Female paratype from Twin Cays, Stann Creek District, Belize. Carapace brown with large white eye region, white lateral posterior extensions, and short median posterior extension (Fig. 162). Legs white, ringed black on distal ends of articles. Femur I with row of four macrosetae on anterior side; none on anteroventral side. Dorsum of abdomen with usual *Metepeira* folium, though frequently with deep red pigmentation on anterior half (Fig. 162). Venter wide, white median line with pair of large white spots on either side of spiracle (Fig. 163). Sternum with wide median white line widening anteriorly with constriction in center (Fig. 163). Ratio of eye diameters: posterior medians and anterior medians 1.0, anterior laterals 1.3, posterior laterals 1.3. Anterior median eyes separated by 1.2 diameters, posterior median eyes by 0.8, anterior median eyes separated from anterior laterals by 2 diameters of anterior lateral eyes, lateral eyes separated by 0.2 their diameters. Total length 3.9 mm. Carapace 1.8 mm long, 1.4 wide. First femur 2.2 mm, patella and tibia 2.1, metatarsus 1.6, tarsus 0.8. Sec-

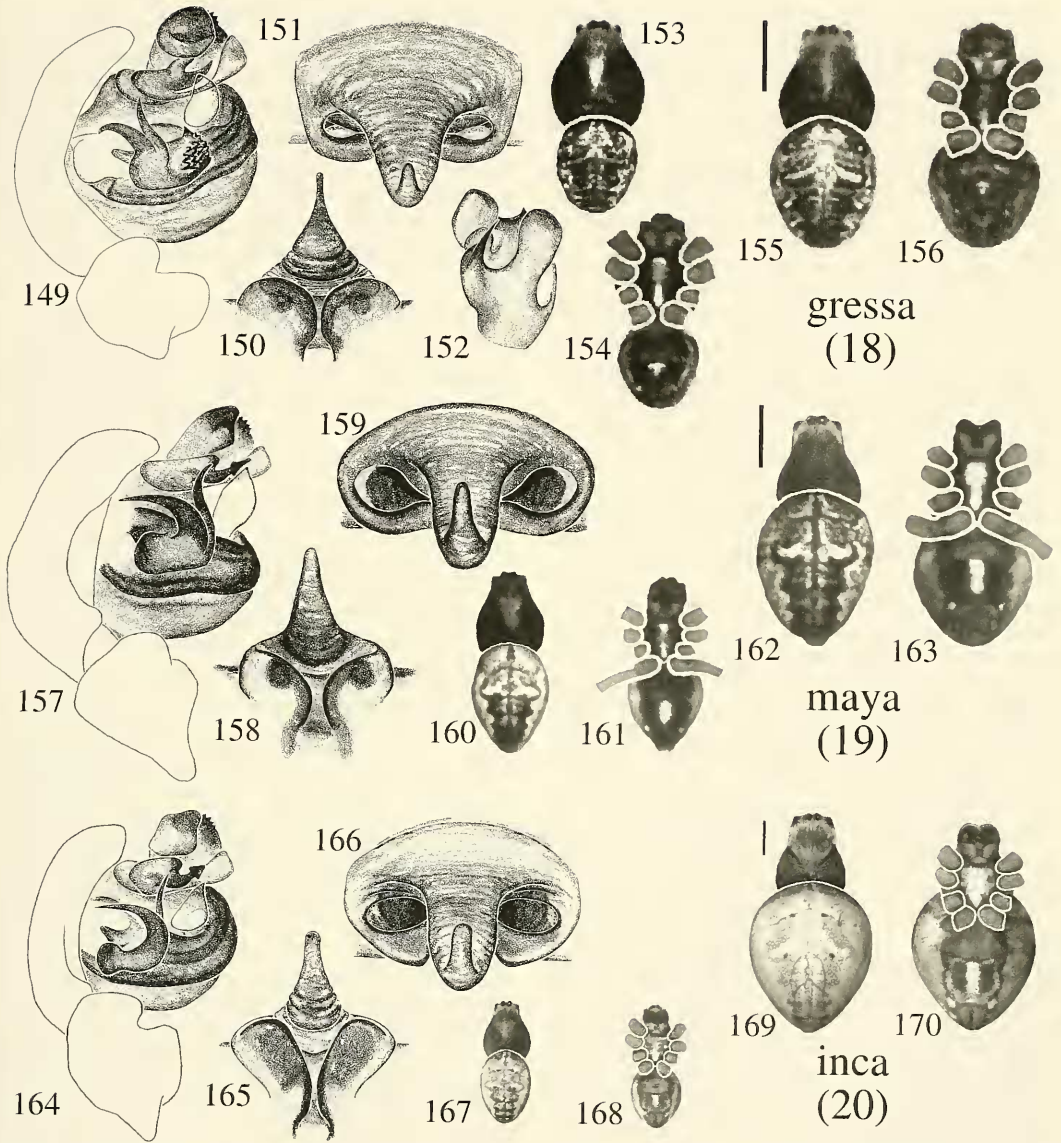
ond patella and tibia 1.8 mm, third 1.0, fourth 1.6.

Male holotype. Carapace dark with light region around eyes and light triangular mark anterior to thoracic furrow (Fig. 160). Legs darker than in female. Femur I with row of four macrosetae on anterior side; four on anteroventral side. Dorsum, venter, sternum as in female except median white line on sternum usually broken (Figs. 160, 161). Ratio of eye diameters: posterior medians and anterior medians 1.0, anterior laterals 1.4, posterior laterals 1.2. Anterior median eyes separated by 1.2 diameters, posterior median eyes by 0.9, anterior median eyes separated from anterior laterals by 1.7 diameters of anterior lateral eyes, lateral eyes separated by 0.3 their diameters. Total length 3 mm. Carapace 1.5 mm long, 1.2 wide. First femur 2.2 mm, patella and tibia 2.3, metatarsus 1.8, tarsus 0.9. Second patella and tibia 1.8 mm, third 1.0, fourth 1.4.

Diagnosis. Unlike others in the *M. incrassata* species group, *M. maya* and *M. inca* both have distal embolic apophyses that project forward, forming rounded bumps (Figs. 157, 164). The male palps of these two species differ by the thickness of the flagellae and base on the median apophysis: thicker in *M. maya* than in *M. inca* (compare Fig. 157 with Fig. 164). The epigynum of *M. maya* resembles those of *M. inca* and *M. comanche* because the oval epigynal openings are formed out of membranous surfaces that are distinctly separate from the base of the scape (Figs. 159, 166, 187). The epigynal openings of *M. maya* (Fig. 159) are much wider than those of *M. comanche* (Fig. 187); and the posterior lobes on *M. maya* are thickened (Fig. 159) but not pointed as in *M. inca* (Fig. 166).

Variation. Average body length of five females examined 5.2 mm, range 3.9 to 6.3 mm. Average body length of four males examined 2.8 mm, range 2.3 to 3.1 mm.

Natural History. Mature specimens have been collected in March through August



Figures 149–156. *Metepeira gressa* (Keyserling) (sp. 18; 34°50'S, 56°26'W). 149, male palpus, mesal. 150, epigynum, posterior. 151, epigynum, ventral. 152, male embolic division, ventral. 153, male, dorsal. 154, male, ventral. 155, female, dorsal. 156, female, ventral.

Figures 157–163. *Metepeira maya* new species (sp. 19; 16°50'N, 88°5'W). 157, male palpus, mesal. 158, epigynum, posterior. 159, epigynum, ventral. 160, male, dorsal. 161, male, ventral. 162, female, dorsal. 163, female, ventral.

Figures 164–170. *Metepeira inca* new species (sp. 20; 4°30'S, 81°8'W). 164, male palpus, mesal. 165, epigynum, posterior. 166, epigynum, ventral. 167, male, dorsal. 168, male, ventral. 169, female, dorsal. 170, female, ventral.

Scale bars: dorsum and venter figures 1.0 mm.

(Fig. 317). Habitats range from mangroves at sea level to pine forests at 1,600 m.

Distribution. Southern Mexico to Costa Rica (Map 14).

Records Examined. BELIZE *Stann Creek*: Twin Cays, Andera Flats, 16°50'N, 88°5'W, 20.iii.1986 (P. Sierwald, USNM); Twin Cays, North part of West Pond, West of Swamp Doc, 16°50'N, 88°5'W, 28.iii.1986 (P. Sierwald, USNM); Twin Cays, Northwest Point, North Bay, 16°50'N, 88°5'W, 14.iii.1986 (P. Sierwald, USNM); Twin Cays, Northwest Point, North Bay, ground not flooded, 16°50'N, 88°5'W, 14.iii.1986 (P. Sierwald, USNM); Twin Cays, red mangrove, 16°50'N, 88°5'W, 17.v.1985 (Feller, USNM); Twin Cays, white mangrove, 16°50'N, 88°5'W, 15.vi.1984 (Feller, USNM), 5.vi.1985 (Erwin, Mathis, Sims, USNM). COSTA RICA *San José*: San José, 9°56'N, 84°5'W (Tristan & Banks, MCZ). GUA-TEMALA *Chiquimula*: Chiquimula, 14°48'N, 89°33'W, 22.vii.1947 (C. & P. Vaurie, AMNH). *Sacatepequez*: Antigua, 14°34'N, 90°44'W, 16.viii.1947 (C. & P. Vaurie, AMNH). MEXICO *Chiapas*: Comitán de Domínguez, 16°15'N, 92°8'W, 19.vii.1950 (C. J. & M. Goodnight, AMNH); near Río San Gregorio, between Comitán and Ocotlán, 15°45'N, 92°0'W, 18.vii.1950 (C. J. & M. Goodnight, AMNH); pine forest, 15 mi NW Arriaga, 16°25'N, 94°1'W, 27.viii.1966 (Jean & Wilton Ivie, AMNH); Tuxtla Gutiérrez, 16°45'N, 93°7'W, 10.vi.1964 (Pallister, AMNH). NICARAGUA *Matagalpa*: Matagalpa, 12°53'N, 85°57'W, 15.vii.1989 (R. Reimbold, JMM).

20. *Metepeira inca* new species

Figures 164–170, 318; Map 11

Holotype. Male from Pariñas Valley, Piura, Peru, 21.v.1939, D. L. & H. E. Frizzell, in CAS. The specific name is a noun in apposition after the Quechuan people who once ruled Peru.

Description. Female paratype from Pariñas Valley, Piura, Peru. Light reddish brown carapace, white around eyes, very faint light mark in center (Fig. 169). Legs white; slightly darker on dorsal surfaces. Femur I with row of four to five macrosetae on anterior side; none on anteroventral side. Dorsal folium white; darker on shoulders and posteriorly (Fig. 169). Venter grayish brown with wide white median mark inside U-shaped pattern; pair of white spots on either side of spiracle (Fig. 170). Sternum white (Fig. 170). Ratio of eye diameters: posterior medians and anterior medians 0.9, anterior laterals 1.0, posterior laterals 1.1. Anterior median

eyes separated by 1.6 diameters, posterior median eyes by 1.3, anterior median eyes separated from anterior laterals by 2.5 diameters of anterior lateral eyes, lateral eyes separated by 0.3 their diameters. Total length 6.8 mm. Carapace 2.9 mm long, 2.3 wide. First femur 3 mm, patella and tibia 3.3, metatarsus 2.6, tarsus 1. Second patella and tibia 2.8 mm, third 1.7, fourth 2.5.

Male holotype. Light reddish brown carapace, white around eyes, faint light triangular mark in center (Fig. 167). Legs white, save for light reddish brown on dorsal surfaces of femora and patellae. Femur I with row of three macrosetae on anterior side; two to three on anteroventral side. Dorsal folium white with wavy black lines thickening posteriorly (Fig. 167). Venter and sternum as in female (Fig. 168). Ratio of eye diameters: posterior medians and anterior medians 1.0, anterior laterals 1.3, posterior laterals 1.1. Anterior median eyes separated by 1.3 diameters, posterior median eyes by 0.8, anterior median eyes separated from anterior laterals by 1.9 diameters of anterior lateral eyes, lateral eyes almost touching. Total length 3.7 mm. Carapace 1.9 mm long, 1.4 wide. First femur 2.9 mm, patella and tibia 2.9, metatarsus 2.7, tarsus 1. Second patella and tibia 2.4 mm, third 1.3, fourth 1.9.

Diagnosis. Unlike others in the *M. incassata* species group, *M. inca* and *M. maya* both have distal embolic apophyses that project forward, forming rounded bumps (Figs. 157, 164). The male palps of these two species are separated by the thinner flagellae and base on the median apophysis of *M. inca* (compare Fig. 164 with Fig. 157). The epigynum of *M. inca* resembles those of *M. maya* and *M. comanche* because the oval epigynal openings are formed out of membranous surfaces that are distinctly separate from the base of the scape (Figs. 159, 166, 187). The epigynal openings of *M. inca* (Fig. 166) are much wider than those of *M. comanche* (Fig. 187); the posterior lobes on *M. inca*

are pointed (Fig. 166), not just thickened, as in *M. maya* (Fig. 159).

Variation. Average body length of six females examined 5.7 mm, range 5.2 to 6.8 mm. Average body length of four males examined 3.7 mm, range 2.8 to 4.4 mm. Coloration varies significantly among localities, especially in the males, where some are frequently much darker than others.

Natural History. Mature specimens have been collected in April through October (Fig. 318) at elevations between 300 and 600 m.

Distribution. Most northern tip of Peru (Map 11).

Records Examined. PERU *Piura*: 12 mi N Man-cora, 4°0'S, 80°54'W, 11.xii.1938; Pariñas Valley, 4°30'S, 81°8'W, 3.iv.1939, 8.iv.1939, 16.iv.1939, 7.v.1939, 21.v.1939, 25.vi.1939, 3.vii.1939, 6.viii.1939, 15.viii.1939, 15.x.1939; Quebrada de Pariñas, 4°32'S, 81°17'W, 14.iv.1939, 7.v.1939, 21.v.1939; Quebrada Mogollon, 4°32'S, 81°4'W, 30.iv.1939, 11.vi.1939, 18.vi.1939, 21.vi.1939, 11.vii.1939, 16.vii.1939, 24.ix.1939 (all records: D. L. & H. E. Frizzell, CAS).

21. *Metepeira gosoga*

Chamberlin and Ivie

Figures 171–177, 322; Map 9

Metepeira gosoga Chamberlin and Ivie, 1935: 21 figs 82–83, ♀. Female holotype from Pilot Knob Valley, Mohave Desert, California, in the AMNH, examined. Roewer, 1942: 868. Bonnet, 1957: 2820. Levi, 1977: 200, figs. 28–36.

Description. Female from Baja California Norte, Mexico. Carapace dirty yellowish brown, lighter anterior half, darker diamond-shaped mark behind eyes (Fig. 176). Legs same color as carapace; dark rings on distal ends of articles. Femur I with row of three to five macrosetae on anterior side; two or three macrosetae on anteroventral side. Folium lighter than in other species, darkening posteriorly (Fig. 176). Venter black surrounded by yellow. Wide white median line with pair of large white spots on either side of spiracle. Sometimes with parallel pair of lateral white lines that join transverse white line posteriorly (Fig. 177). Sternum black with wide, white line widening anteriorly, often

broken in center (Fig. 177). Ratio of eye diameters: posterior medians and anterior medians 0.9, anterior laterals 1.3, posterior laterals 1.2. Anterior median eyes separated by 1.2 diameters, posterior median eyes by 0.6, anterior median eyes separated from anterior laterals by 3.4 diameters of anterior lateral eyes, lateral eyes separated by 0.4 their diameters. Total length 8.3 mm. Carapace 4 mm long, 3.3 wide. First femur 4.5 mm, patella and tibia 4.8, metatarsus 4.5, tarsus 1.3. Second patella and tibia 4.3 mm, third 2.5, fourth 3.8.

Male from Baja California Norte, Mexico. Male carapace, dorsum, venter, sternum as in female (Figs. 174, 175). Femur I with row of five macrosetae on anterior side; row of nine macrosetae on anteroventral side. Ratio of eye diameters: posterior medians and anterior medians 0.8, anterior laterals 1.1, posterior laterals 1.3. Anterior median eyes separated by 1 diameter, posterior median eyes by 0.8, anterior median eyes separated from anterior laterals by 2.1 diameters of anterior lateral eyes, lateral eyes separated by 0.2 their diameters. Total length 5.5 mm. Carapace 2.8 mm long, 2.3 wide. First femur 4.5 mm, patella and tibia 4.5, metatarsus 4.5, tarsus 1.4. Second patella and tibia 3.8 mm, third 1.9, fourth 3.

Diagnosis. Within the *M. incrassata* species group, only *M. gosoga*, *M. inca*, and *M. maya* have projecting distal embolic apophyses (Figs. 157, 164, 171). Of these, only *M. gosoga* has a distinctly pointed one (Fig. 171). The epigynum of *M. gosoga* differs from those of other species in the *M. incrassata* group by the small, oval shape of the openings (Fig. 173).

Variation. Average body length of two females examined 6.8 mm, range 5 to 8.5 mm. Average body length of two males examined 4.9 mm, range 4.1 to 5.7 mm.

Natural History. Mature specimens have been collected in June through August (Fig. 322) between 500 and 2,000 m. Levi (1977) notes that these have been collected on *Opuntia* and desert vegetation.

Distribution. Southwestern U.S. and Baja California Norte, Mexico (Levi, 1977, map 1; Map 9).

Records Examined. MEXICO *Baja Calif. Norte*: 23 mi S Catavina, 29°32'N, 114°57'W, 20.vi.1983 (L. Strange & R. Miller, FSCA). USA *Arizona*: Show Low Lake, 34°12'N, 110°0'W, 15.viii.1966 (MCZ).

22. *Metepeira olmec* new species Figures 178–184, 324; Map 11

Holotype. Female from Fortín de las Flores, Veracruz, Mexico, 26.vi.1944, L. I. Davis, in AMNH. The specific name is a noun in apposition after the ancient Indian people of southern Veracruz and Tabasco.

Description. Female holotype. Carapace reddish brown with white region around eyes that extends posteriorly along lateral margins (Fig. 183). Legs ringed on distal ends of articles. Femur I with row of four macrosetae on anterior side; none on anteroventral side. Dorsum of abdomen with usual *Metepeira folium* (Fig. 183). Venter of abdomen with wide, long white median line set within surrounding U-shaped markings. Pair of white spots on either side of spiracle (Fig. 184). Sternum has wide median white line widening anteriorly with broken constriction in center (Fig. 184). Ratio of eye diameters: posterior medians and anterior medians 1.0, anterior laterals 1.1, posterior laterals 1.5. Anterior median eyes separated by 1.5 diameters, posterior median eyes by 0.8, anterior median eyes separated from anterior laterals by 2.1 diameters of anterior lateral eyes, lateral eyes separated by 0.2 their diameters. Total length 5.9 mm. Carapace 2.8 mm long, 2 wide. First femur 2.8 mm, patella and tibia 2.8, metatarsus 2.5, tarsus 1. Second patella and tibia 2.5 mm, third 1.5, fourth 2.3.

Male paratype from Fortín de las Flores, Veracruz, Mexico. Carapace dark with light region around eyes and a light mark anterior to thoracic furrow (Fig. 181). Legs darker than in female. Macrosetae on legs variable with spider's size—femur I with row of three or four macrosetae on anterior side; one to three on anteroventral

side. Dorsum, venter, sternum as in female, except median white line on venter shortened to spot and median white line on sternum often broken (Figs. 181, 182). Ratio of eye diameters: posterior medians and anterior medians 1.0, anterior laterals 1.3, posterior laterals 1.3. Anterior median eyes separated by 1.3 diameters, posterior median eyes by 0.8, anterior median eyes separated from anterior laterals by 1.3 diameters of anterior lateral eyes, lateral eyes separated by 0.1 their diameters. Total length 2.8 mm. Carapace 1.4 mm long, 1.2 wide. First femur 1.7 mm, patella and tibia 1.6, metatarsus 1.1, tarsus 0.7. Second patella and tibia 1.3 mm, third 0.8, fourth 1.1.

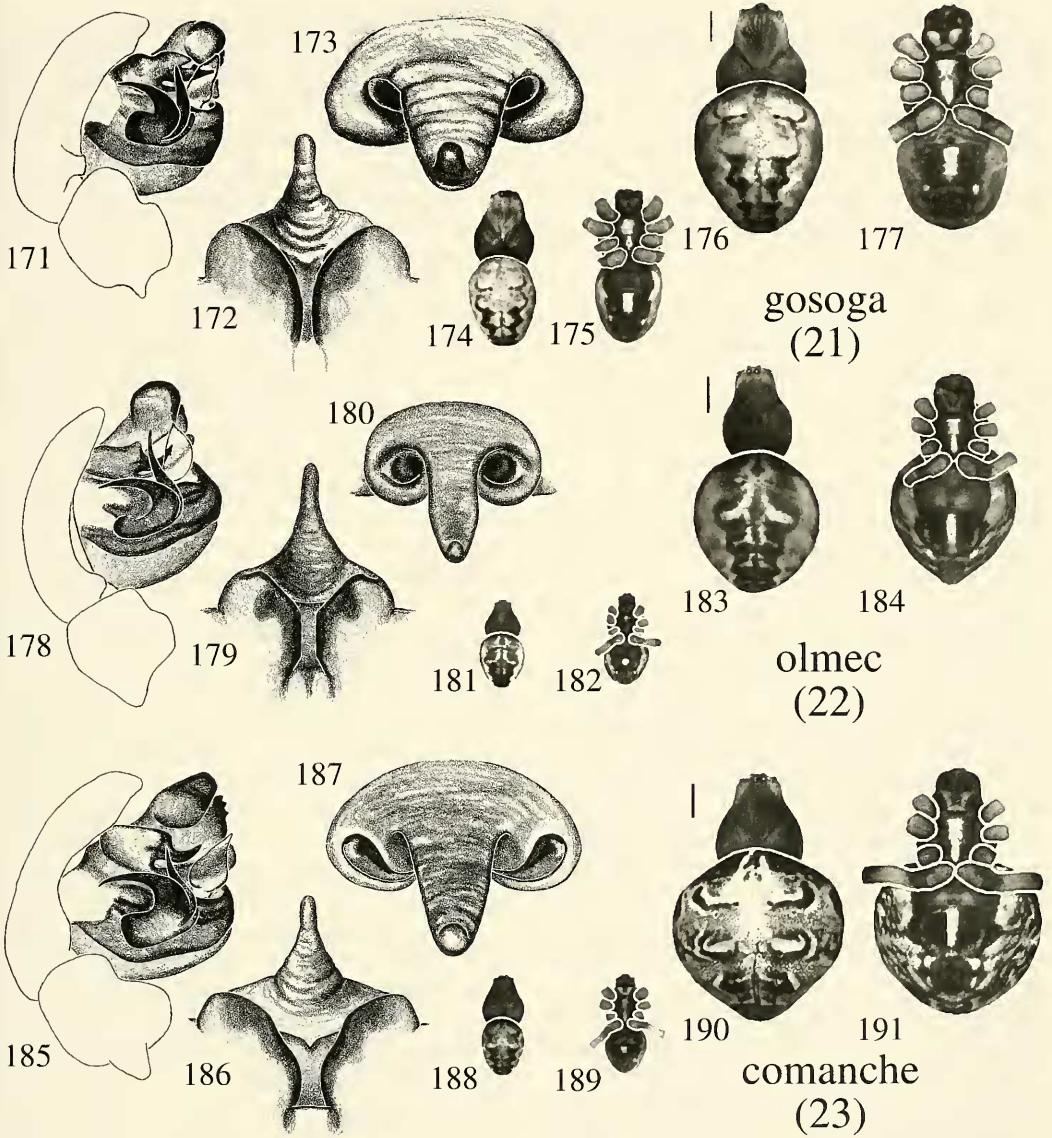
Diagnosis. Female *M. olmec* are diagnosed by their almost perfectly round epigynal depressions with uniform thickness around the posterior edges (Fig. 180). The male embolus is relatively short and has a vestigial distal embolic apophysis that does not project forward, but instead drops off, forming a sharp curve (Fig. 178). Among other species in the *M. incrassata* species group, this embolus shape is also seen in *M. comanche* and *M. triangularis*: unlike *M. comanche* (Fig. 185), the darker, sclerotized portion of the embolus does not extend over the hump of the distal embolic apophysis; unlike *M. triangularis* (Fig. 199), the flagellae are thicker than the base of the median apophysis.

Variation. Average body length of four females examined 6.2 mm, range 5.6 to 6.7 mm. Average body length of three males examined 2.3 mm, range 2.2 to 2.6 mm.

Natural History. Mature specimens have been collected perennially (Fig. 324) at elevations between 500 and 1,400 m.

Distribution. Montane rain forests from Veracruz to Panama (Map 11).

Records Examined. COSTA RICA *San José*: San Antonio de Escanza, 9°59'N, 84°11'W [?], 4.iii.1984 (W. Eberhard, MCZ). MEXICO *Veracruz*: Fortín de las Flores, 18°54'N, 97°0'W, 26.vi.1944 (L. I. Davis, AMNH); Papantla, 20°27'N, 97°19'W, 12.x.1947 (H. Wagner, AMNH). PANAMA *Chiriquí*: Boquete, 8°47'N, 82°26'W, 15.viii.1950 (A. M. Chickering,



Figures 171–177. *Metepeira gosoga* Chamberlin and Ivie (sp. 21; 29°32'N, 114°57'W). 171, male palpus, mesal. 172, epigynum, posterior. 173, epigynum, ventral. 174, male, dorsal. 175, male, ventral. 176, female, dorsal. 177, female, ventral.
 Figures 178–184. *Metepeira olmec* new species (sp. 22; 18°54'N, 97°0'W). 178, male palpus, mesal. 179, epigynum, posterior. 180, epigynum, ventral. 181, male, dorsal. 182, male, ventral. 183, female, dorsal. 184, female, ventral.
 Figures 185–191. *Metepeira comanche* Levi (sp. 23 [185,188,189] 33°22'N, 99°56'W; [186,187] 25°45'N, 101°55'W; [190,191] 26°41'N, 101°23'W). 185, male palpus, mesal. 186, epigynum, posterior. 187, epigynum, ventral. 188, male, dorsal. 189, male, ventral. 190, female, dorsal. 191, female, ventral.
 Scale bars: dorsum and venter figures 1.0 mm.

MCZ), 7.viii.1954 (A. M. Chickering, MCZ). *Panamá*: Cerro Galera, 8°55'N, 79°38'W, 7.i.1977 (H. W. Levi & Y. Lubin, MCZ).

23. *Metepeira comanche* Levi

Figures 185–191, 331; Map 11

Metepeira comanche Levi, 1977: 204, figs. 61–69, ♂, ♀. Male holotype from 9.7 km west of O'Brien, Haskell Co., Texas, in the MCZ, examined. Brignoli, 1983: 275.

Description. Female from Gloria, Coahuila, Mexico. Carapace dark with light region around eyes, extending posteriorly behind posterior lateral eyes (Fig. 190). Legs ringed. Femur I with row of four macrosetae on anterior side; one or two on anteroventral side. Dorsal folium high in contrast; black comma-shaped markings shadow white fleur-de-lis pattern (Fig. 190). Venter of abdomen with wide white median line posteriorly set within surrounding U-shaped marking. Pair of white spots on either side of spiracle (Fig. 191). Sternum has wide median white line widening anteriorly (Fig. 191). Ratio of eye diameters: posterior medians and anterior medians 0.9, anterior laterals 1.2, posterior laterals 1.1. Anterior median eyes separated by 1.2 diameters, posterior median eyes by 1.0, anterior median eyes separated from anterior laterals by 2.7 diameters of anterior lateral eyes, lateral eyes separated by 0.2 their diameters. Total length 7.8 mm. Carapace 3.3 mm long, 2.5 wide. First femur 3.6 mm, patella and tibia 3.9, metatarsus 3.4, tarsus 1.2. Second patella and tibia 3.3 mm, third 2, fourth 2.9.

Male from 9.7 km west of O'Brien, Haskell Co., Texas. Carapace light around eyes, darker posteriorly (Fig. 188). Legs ringed. Macrosetae on femur 1 variable; usually row of four macrosetae on anterior side, six on anteroventral side. Dorsum with usual *Metepeira* folium (Fig. 188). Venter with median oval white mark; pair of white spots on either side of spiracle (Fig. 189). Median white line on sternum usually broken (Fig. 189). Ratio of eye diameters: posterior medians and anterior medians 1.0, anterior laterals 1.3, posterior

laterals 1.3. Anterior median eyes separated by 1.4 diameters, posterior median eyes by 0.9, anterior median eyes separated from anterior laterals by 1.6 diameters of anterior lateral eyes, lateral eyes separated by 0.2 their diameters. Total length 3.1 mm. Carapace 1.7 mm long, 1.3 wide. First femur 2.4 mm, patella and tibia 2.2, metatarsus 2, tarsus 0.9. Second patella and tibia 1.9 mm, third 1.0, fourth 1.5.

Diagnosis. The epigynum of *M. comanche* resembles those of *M. maya* and *M. inca* because the oval epigynal openings are formed out of membranous surfaces that are distinctly separate from the base of the scape (Figs. 159, 166, 187). The epigynum of *M. comanche* differs from *M. maya* and *M. inca* by having much narrower epigynal openings (compare Fig. 187 with Figs. 159, 166). The male embolus is relatively short and has a vestigial distal embolic apophysis that does not project forward, but instead drops off, forming a sharp curve (Fig. 185). Among other species in the *M. incrassata* species group, this embolus shape is also seen in *M. olmec* and *M. triangularis*: unlike *M. olmec* (Fig. 178), the darker, sclerotized portion of the embolus extends over the hump of the distal embolic apophysis; unlike *M. triangularis* (Fig. 199), the flagellae and base of the median apophysis are wide (Fig. 185).

Natural History. Mature specimens have been collected from May to November (Levi, 1977, Fig. 331).

Distribution. New Mexico, Texas, and northern Mexico (Levi, 1977, map 1; Map 11).

Records Examined. MEXICO *Coahuila*: Gloria, 26°41'N, 101°23'W, 24.viii.1947 (W. J. Gertsch, AMNH); Paila, 25°45'N, 101°55'W, 21.viii.1947 (W. J. Gertsch, AMNH).

24. *Metepeira pimungan* new species

Figures 192–198, 330; Map 9

Holotype. Male from San Miguel Island, Santa Barbara Co., California, USA, 20.vii.1968, M. E. Thompson, in the MCZ. The specific name is a noun in apposition after the Indian people who once lived on the Channel Islands.

Description. Female paratype from San Miguel Island, California USA. Carapace with large white eye region and lateral posterior extensions. White median arrow-shaped mark extends to thoracic furrow (Fig. 197). Legs mostly white with rings on legs III and IV. Femur I with row of four macrosetae on anterior side; one on anteroventral side. Dorsum of abdomen with usual *Metepeira folium* (Fig. 197); venter wide, with long white median line, flanked by shorter parallel thin white lines on either side. Pair of white spots on either side of spiracle. Sternum black with posterior drop-shaped white mark (Fig. 198). Ratio of eye diameters: posterior medians and anterior medians 1.0, anterior laterals 1.4, posterior laterals 1.3. Anterior median eyes separated by 1.6 diameters, posterior median eyes by 1.0, anterior median eyes separated from anterior laterals by 3.4 diameters of anterior lateral eyes, lateral eyes separated by 0.3 their diameters. Total length 6.9 mm. Carapace 3.3 mm long, 2.6 wide. First femur 3.5 mm, patella and tibia 3.5, metatarsus 2.8, tarsus 1.3. Second patella and tibia 3 mm, third 1.9, fourth 2.8.

Male holotype. Carapace, legs, abdomen, venter, sternum as in female, though legs darker and not ringed (Figs. 195, 196). Femur I with row of four to five macrosetae on anterior side; four to five on anteroventral side; both rows concentrated distally on femur. Ratio of eye diameters: posterior medians and anterior medians 1.0, anterior laterals 1.3, posterior laterals 1.3. Anterior median eyes separated by 1.6 diameters, posterior median eyes by 0.8, anterior median eyes separated from anterior laterals by 1.9 diameters of anterior lateral eyes, lateral eyes separated by 0.3 their diameters. Total length 4.5 mm. Carapace 2.3 mm long, 1.8 wide. First femur 3.1 mm, patella and tibia 3, metatarsus 2.8, tarsus 1. Second patella and tibia 2.5 mm, third 1.3, fourth 1.9.

Diagnosis. Like *M. atascadero*, but unlike other species in the *M. incrassata* group, the posterior end of the sternum of

M. pimungan has a white water drop mark (Figs. 196, 198). Unlike *M. atascadero*, *M. pimungan* lacks U-shaped white markings on the venter, just anterior to the spiracle (compare Fig. 198 with Fig. 221). In contrast to other species in the *M. incrassata* group, the embolus on male *M. pimungan* specimens is curved to form a gentle S-shape (Fig. 192). The female has a squarish-shaped black mark inside each epigynal depression (Fig. 198) which is not seen in other *M. incrassata* group species.

Variation. Average body length of four females examined 7.7 mm, range 6.9 to 8.5 mm. Average body length of five males examined 5.3 mm, range 4.6 to 6.4 mm.

Natural History. Mature specimens have been collected in August (Fig. 330). Webs are found near the ground, sheltered from the perennial strong winds by *Coryopsis* and lupines.

Distribution. Endemic to San Miguel Island (Map 9).

Records Examined. USA California: San Miguel Island, 34°2'28.6"N, 120°21'13.6"W, 11.viii.1995 (W. H. Piel, MCZ); 34°2'6.1"N, 120°21'9.1"W, 12.viii.1995 (W. H. Piel, MCZ); 34°2'N, 120°22'W, 20.viii.1968 (M. E. Thompson, MCZ); 34°3'3.1"N, 120°21'53.3"W, 13.viii.1995 (W. H. Piel, MCZ); behind dunes on beach, 34°2'43.8"N, 120°21'0.8"W, 11.viii.1995 (W. H. Piel, MCZ).

25. *Metepeira triangularis* (Franganillo) Figures 199–205, 337; Map 14

Mangora triangularis Franganillo, 1930: 21–22. Female holotype from Sierra Maestra, lost. Platnick, 1993: 449.

Metepeira labyrinthica:—Franganillo, 1936: 75. Bryant, 1940: 341. Platnick, 1993: 449.

Metepeira triangularis:—Archer, 1958: 15, fig. 37, ♀.

Metepeira acostai Archer, 1958: 15, fig. 36, ♀. Female holotype from the savannas, Agramont, Camagüey Province, Cuba, in the AMNH, examined. NEW SYNONYMY.

Metepeira bani Archer, 1965: 132, figs. 11, 17 ♀, 13 ♂. Male and female syntypes from Baní, Dominican Republic, in the AMNH, examined. NEW SYNONYMY. Brignoli, 1983: 275.

Note. Franganillo's collection vials are not labeled, making it impossible to find the holotype. Based on the descriptions by Franganillo (1930), Archer (1958), the illustrations of Archer (1958, 1965), and material determined by Archer, I conclude that there is no evidence to support three

separate species. For the name *M. triangularis*, I designate a female neotype from Camagüey Province, Cuba. 21°30'N, 78°10'W, x.1954 (J. T. Acosta, AMNH).

Description. Female from La Descubierta, Lago Enriquillo, Isla Cabritos, Dominican Republic. Light reddish brown carapace, white around eyes (Fig. 204). Legs yellowish white, sometimes ringed brown at distal ends of articles. Femur I with row of three, or sometimes four, macrosetae on anterior side; none on anteroventral side. Dorsal folium white with slightly darker markings posteriorly (Fig. 204). In some cases, dark anterior marks on shoulders of dorsum. Venter of abdomen black with wide white median line, sometimes flanked by thinner white lines that together form an anchor shape (Fig. 205). Pair of small white spots on either side of spiracle. Sternum black with median white line, wider anteriorly (Fig. 205). Ratio of eye diameters: posterior medians and anterior medians 1.0, anterior laterals 1.4, posterior laterals 1.4. Anterior median eyes separated by 1.5 diameters, posterior median eyes by 1.1, anterior median eyes separated from anterior laterals by 3.3 diameters of anterior lateral eyes, lateral eyes separated by 0.2 their diameters. Total length 5.9 mm. Carapace 2.7 mm long, 2 wide. First femur 2.6 mm, patella and tibia 2.9, metatarsus 2.5, tarsus 1. Second patella and tibia 2.4 mm, third 1.4, fourth 2.2.

Male from La Descubierta, Lago Enriquillo, Isla Cabritos, Dominican Republic. Carapace as in female, though lighter eye region often extends to cover entire anterior half (Fig. 202). Legs yellowish white. Distal half of femora often dark. Femur I with row of four macrosetae on anterior side; three to five on anteroventral side. Dorsal folium white with slightly darker markings posteriorly (Fig. 202). Venter of abdomen as in female; sternum black with median white line (Fig. 203). Ratio of eye diameters: posterior medians and anterior medians 1.1, anterior laterals 0.7, posterior laterals 1.1. Anterior median eyes separated

by 1.6 diameters, posterior median eyes by 0.8, anterior median eyes separated from anterior laterals by 1.0 diameters of anterior lateral eyes, lateral eyes separated by 0.1 their diameters. Total length 4.2 mm. Carapace 2 mm long, 1.5 wide. First femur 2.9 mm, patella and tibia 3, metatarsus 2.8, tarsus 1.1. Second patella and tibia 2.4 mm, third 0.8, fourth 1.3.

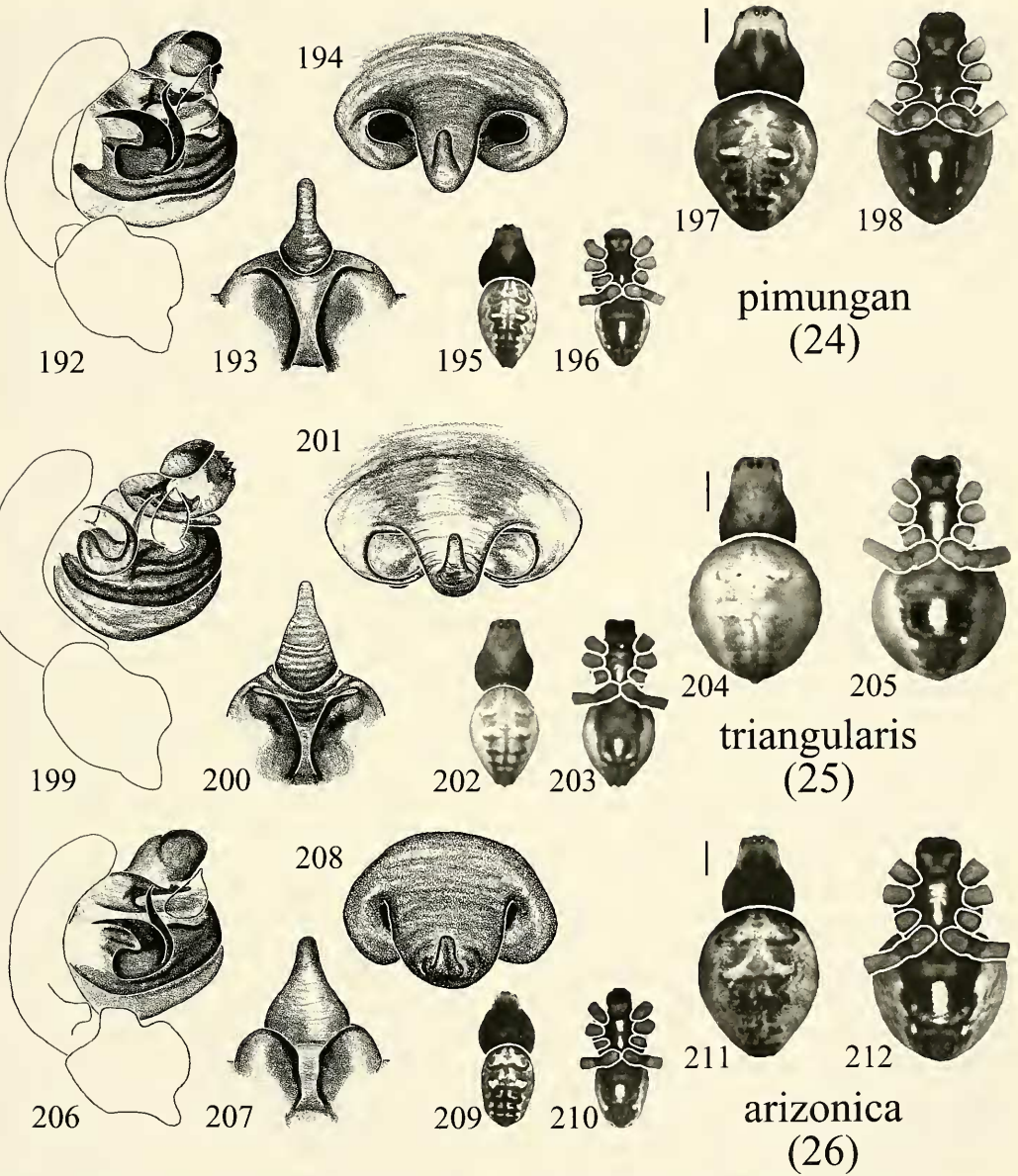
Diagnosis. The epigynum of *M. triangularis* differs from other species by the thin, sclerotized openings in the shape of Ray-Ban sunglasses (Fig. 201). The male embolus has a vestigial distal embolic apophysis that does not project forward, but instead drops off, forming a sharp curve (Fig. 199). Among other species in the *M. incrassata* species group, shorter versions of this embolus shape is also seen in *M. comanche* and *M. olmec*: unlike *M. comanche* (Fig. 185), the darker, sclerotized portion of the embolus does not extend over the hump of the distal embolic apophysis; unlike *M. olmec* (Fig. 178), the flagellae and base of the median apophysis are much thinner (Fig. 199).

Variation. Average body length of seven females examined 5.5 mm, range 4.6 to 6.3 mm. Average body length of five males examined 3.8 mm, range 3.2 to 4.3 mm.

Natural History. Mature specimens have been collected from June to February, although I suspect that like other Caribbean species, *M. triangularis* is actually entirely perennial (Fig. 337).

Distribution. Dominican Republic and Cuba (Map 14).

Records Examined. CUBA *Camagüey Prov.*: 21°30'N, 78°10'W, x.1954 (J. T. Acosta, AMNH). *Matanzas*: Matanzas, Parque Watkins, 23°3'N, 81°35'W, 9.viii.1955 (A. F. Archer, AMNH); Pan de Palenque [?], 23°1'N, 81°43'W, 11.viii.1955 (A. F. Archer, AMNH). *Oriente*: Banes, 20°58'N, 75°43'W, 2.viii.1955 (A. F. Archer, AMNH); Cuabitas, Santiago, 20°4'N, 75°48'W, 15.xii.1955 (P. Alayo, AMNH); Puerto Boniato, 20°7'N, 75°47'W, 4.xi.1945 (P. Alayo, AMNH). *Sierra las Casas*: Isla de Pinos, 21°53'N, 82°48'W, 17.viii.1955 (A. F. Archer, AMNH). DOMINICAN REPUBLIC *Azua*: Hatillo, 18°24'N, 70°32'W, 30.i.1991 (Felix E. Del Monte, CAS). *Banahona*: Sierra Martín García [?], 18°25'N, 70°30'W, 8.viii.1958 (A. F. Archer & E. de Boyrie Moya,



Figures 192–198. *Metepeira pimungan* new species (sp. 24; 34°2'N, 120°22'W). 192, male palpus, mesal. 193, epigynum, posterior. 194, epigynum, ventral. 195, male, dorsal. 196, male, ventral. 197, female, dorsal. 198, female, ventral.
 Figures 199–205. *Metepeira triangularis* (Franganillo) (sp. 25; 18°34'N, 71°44'W). 199, male palpus, mesal. 200, epigynum, posterior. 201, epigynum, ventral. 202, male, dorsal. 203, male, ventral. 204, female, dorsal. 205, female, ventral.
 Figures 206–212. *Metepeira arizonica* Chamberlin and Ivie (sp. 26; 28°53'N, 113°4'W). 206, male palpus, mesal. 207, epigynum, posterior. 208, epigynum, ventral. 209, male, dorsal. 210, male, ventral. 211, female, dorsal. 212, female, ventral.
 Scale bars: dorsum and venter figures 1.0 mm.

AMNH). *La Independencia*: 2 km SE El Limón, Jimani. S side of road, 18°25'N, 71°45'W, 30.i.1991 (Felix E. Del Monte, MNSD); *Isla Cabritos*: *La Descubierta*, Lago Enriqueillo, 18°34'N, 71°44'W, 18.vi.1981 (E. Marciano, MNSD). *Montecristi*: *Carretera Montecristi*, El Morro [?], 19°54'N, 71°39'W, 2.xii.1991 (Felix E. Del Monte, MNSD), 21.xii.1991 (Felix E. Del Monte, MNSD). *Peravia*: Las Dunas, Prov. Baní [?], 18°25'N, 71°25'W, 23.i.1992 (Felix E. Del Monte, MNSD). *Prov. Trujillo Valdez*: W of Baní, 18°17'N, 70°22'W, 8.viii.1958 (A. F. Archer, AMNH). *San Juan*: 1 km S Las Matas de Farfán, 18°51'N, 71°31'W, 25.viii.1970 (B. Patterson, MCZ).

26. *Metepeira arizonica*

Chamberlin and Ivie

Figures 206–213, 319; Map 9

Metepeira arizonica Chamberlin and Ivie, 1942: 69, figs. 182–187, ♀, ♂. Female holotype from Canyon Lake, Arizona, in the AMNH, examined. Levi, 1977: 200, figs. 12, 13, 39–46, ♀, ♂. Brignoli, 1983: 275.

Description. Female from Isla Partida, Baja Calif. Norte, Mexico. General coloration high in contrast. Carapace dark brown; large white eye region, white lateral posterior extensions, and short median posterior extension (Fig. 211). Distinct black rings on all legs. Femur I with row of four macrosetae on anterior side; four on anteroventral side. Dorsum of abdomen with usual *Metepeira* folium, though generally slightly lighter (Fig. 211); venter wide, with long white median line set within surrounding U-shaped markings. Pair of white spots on either side of spiracle (Fig. 212). Wide median white line widening anteriorly with constriction in center, set on black sternum (Fig. 212). Ratio of eye diameters: posterior medians and anterior medians 1.0, anterior laterals 1.4, posterior laterals 1.2. Anterior median eyes separated by 1.4 diameters, posterior median eyes by 0.9, anterior median eyes separated from anterior laterals by 2.7 diameters of anterior lateral eyes, lateral eyes separated by 0.1 their diameters. Total length 6.2 mm. Carapace 2.8 mm long, 2.2 wide. First femur 3.4 mm, patella and tibia 3.5, metatarsus 3, tarsus 1.2. Second patella and tibia 3 mm, third 1.9, fourth 2.8.

Male from Isla Partida, Baja Calif. Norte, Mexico. Carapace, legs, abdomen, venter, sternum as in female, though legs darker with less distinct rings, and white line on sternum often broken (Figs. 209, 210). Femur I with row of four macrosetae on anterior side; five to eight on anteroventral side. Ratio of eye diameters: posterior medians and anterior medians 1.1, anterior laterals 1.4, posterior laterals 1.2. Anterior median eyes separated by 1.5 diameters, posterior median eyes by 0.7, anterior median eyes separated from anterior laterals by 1.6 diameters of anterior lateral eyes, lateral eyes separated by 0.2 their diameters. Total length 4.4 mm. Carapace 2.3 mm long, 1.8 wide. First femur 3.3 mm, patella and tibia 3.3, metatarsus 3.2, tarsus 1.2. Second patella and tibia 2.8 mm, third 1.5, fourth 2.2.

Diagnosis. Unlike all other species in the *M. incrassata* group, the epigynum of *M. arizonica* is puffy and swollen, causing the openings to reduce (from a ventral view) to crescent-shaped slits (Fig. 187). The embolus differs from others in the *M. incrassata* group because the distal embolic apophysis is reduced to a gentle arching curve (Fig. 206).

Variation. Average body length of nine females examined 5.5 mm, range 4.7 to 6.3 mm. Average body length of 13 males examined 3.9 mm, range 3.1 to 5.1 mm. In some males a small ventral keel is visible extending beyond the flagella of the median apophysis (Levi, 1977, fig. 46).

Natural History. Mature specimens are most commonly collected between April and August (Fig. 319), from dry oak–pine–juniper woodland, alfalfa, cactus, and desert shrub (Levi, 1977). Localities have a large range in altitude, from sea level to 2,300 m; however, spiders from southern regions live at higher elevations than spiders from northern regions (Fig. 213).

Distribution. American southwest to San Luis Potosí (Levi, 1977, map 1; Map 9).

Records Examined. MEXICO Baja Calif. Norte: 15

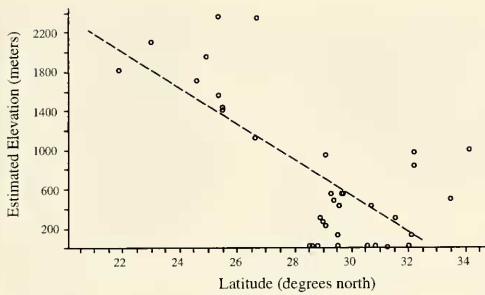


Figure 213. The elevation of collection localities for *M. arizonica* at their corresponding latitudes. Species-specific altitudes appear to decrease with distance from the equator. Elevations estimated from NOAA database of 5- by 5-minute geographic tiles.

mi S Punta Prieta, 28°58'N, 114°17'W, 7.vii.1973 (S. C. Williams & K. B. Blair, CAS); 24 mi S Santa Inés, 29°20'N, 114°20'W, 7.vii.1973 (S. C. Williams & K. B. Blair, CAS); 26 mi S San Felipe, 30°38'N, 114°50'W, 15.iv.1965 (D. Q. Cavagnaro, C. E. & E. S. Ross, V. L. Vesterby, CAS); 6 km NW Racho Santa Inés, 29°43'N, 114°43'W, 28.iii.1981 (Paul E. Blom, WHC); 6 mi S San Felipe, 30°55'N, 114°52'W, 14.iv.1965 (D. Q. Cavagnaro, C. E. & E. S. Ross, V. L. Vesterby, CAS); 9 km NW Racho Santa Inés, 29°46'N, 114°46'W, 3.vii.1981 (David Crowe, WHC); Arroyo de Calamajué at carbonated spring, 29°38'N, 114°25'W, 26.vi.1973 (S. C. Williams & K. B. Blair, CAS); Cañon de Guadalupe, off Laguna Salada, 32°10'N, 115°48'W, 11.i.1958 (V. Roth, AMNH); El Mayor, 32°5'N, 115°13'W, 15.vi.1952 (M. Cazier, W. Gertsch, & R. Schrammel, AMNH); Isla Mejía, 29°34'N, 113°35'W, 30.iv.1921 (J. C. Chamberlin, MCZ); Isla Partida, 28°53'N, 113°4'W, 2.vii.1921 (J. C. Chamberlin, MCZ); Isla San Lorenzo, N end, 28°40'N, 112°52'W, 24.vi.1921 (J. C. Chamberlin, CAS); Isla San Lorenzo, south Tobart, 28°36'N, 112°46'W [?], 9.iv.1921 (J. C. Chamberlin, CAS); Puerto Refugio, N end Angel de la Guarda Isl. Webs in cracks in cliff overhanging beach, 29°34'N, 113°32'W, 18.iv.1962 (Howard W. Campbell, CAS); San Pedro Martir, 30°45'N, 115°13'W, 18.iv.1921 (J. C. Chamberlin, CAS). *Coahuila*: 25 mi SE San Pedro, 25°35'N, 102°50'W, 21.viii.1947 (W. J. Gertsch, AMNH); Cabos, 25°35'N, 101°43'W, 21.viii.1947 (W. J. Gertsch, AMNH); Gloria, 26°41'N, 101°23'W, 24.viii.1947 (W. J. Gertsch, AMNH); Saltillo, 25°25'N, 101°0'W, 23.v.1952 (M. Cazier, W. Gertsch, & R. Schrammel, AMNH). *Durango*: La Loma, 25°27'N, 103°40'W, 20.viii.1947 (W. J. Gertsch, AMNH); Providencia, 26°44'N, 105°56'W, 24.viii.1947 (A. M. Davis, AMNH); San Isidro, 60 mi NW Durango, 25°1'N, 105°6'W, 19.viii.1947 (W. J. Gertsch, AMNH). *San Luis Potosí*: 3 km W. Pilares, 21°55'34"N, 100°48'6"W, 21.x.1994 (W. H. Piel, MCZ). *Sinaloa*: Las Saleras Is. (= Isla Saliaca [?]), 25°11'N, 108°20'W [?], 13.vi.1921 (J. C. Chamberlin,

CAS). *Sonora*: 20 mi N Hermosillo, 29°8'N, 110°58'W, 13.ix.1966 (Jean & Wilton Ivie, AMNH); 20 mi SW Sonoyta, 31°38'N, 113°4'W, 13.vi.1952 (W. J. Gertsch, AMNH); 22 mi E Hermosillo on the banks of Río Sonora, 29°4'N, 110°55'W, 17.viii.1959 (B. A. Branson, AMNH); Los Angeles, 29°27'N, 110°46'W, 4.x.1966 (V. Roth, AMNH); Puerto Peñasco at seashore, 31°20'N, 113°33'W, 3.iv.1968 (D. E. Bixler, MCZ). *Zacatecas*: 14 mi S Fresnillo, 23°5'N, 102°45'W, 4.viii.1954 (W. J. Gertsch, AMNH); 4 mi NE Concepción del Oro, 24°41'N, 101°23'W, 4.vii.1984 (J. B. Woolley, AD). *USA Arizona*: Santa Catalina Mtns., mile 7.9 of Catalina Highway from Tucson to Mt. Lemmon., 32°17'N, 110°48'W, 19.vi.1985 (W. Maddison, MCZ); Tucson, 32°15'N, 110°57'W, 5.vii.1991 (W. H. Piel & G. S. Bodner, MCZ). *California*: Corn Springs, Chuckawalla Mtns., 10 mi SE Desert Center, 33°33'N, 115°24'W, 29.xi.1963 (D. C. Lorn, MCZ); Manzanita chaparral, San Gabriel Canyon, Coldbrook Ranger Station, 34°11'N, 117°53'W, 19.viii.1964 (L. Pinter, MCZ). *Texas*: Big Bend Nat'l Park, Old Ranch House on St. Elena Rd., 29°10'N, 103°30'W, 25.v.1967 (E. Sabath, MCZ).

27. *Metepeira atascadero* new species Figures 214–221, 336; Map 14

Holotype. Male from San Miguel de Allende, Guanajuato, Mexico, 25.x.1982, George Uetz, in MCZ. The specific name is a noun in apposition after the Rancho Hotel Atascadero in San Miguel de Allende. This name was coined by George Uetz when he and his colleagues stayed in Rancho Hotel Atascadero while studying the behavioral ecology of this species. This name has been in informal use in the literature (e.g., Uetz and Hodge, 1990).

Description. Female paratype from San Miguel de Allende, Guanajuato, Mexico. Reddish brown carapace, white around eyes, faint light marks extend posteriorly behind lateral eyes (Fig. 220). Legs yellowish, ringed brown at distal ends of articles. Femur I with row of four macrosetae on anterior side; three on anteroventral side. Largest branches of fleur-de-lis pattern on dorsal folium form large paired white spots (Fig. 220). Venter of abdomen black with wide white median line, flanked by white U-shape mark (Fig. 221). Pair of small white spots on either side of spiracle. Sternum black with white posterior mark (Fig. 221). Ratio of eye diameters: posterior medians and anterior medians 1.0, anterior laterals 1.6, posterior laterals 1.3. Anterior median eyes separat-

ed by 1.4 diameters, posterior median eyes by 0.9, anterior median eyes separated from anterior laterals by 3.7 diameters of anterior lateral eyes, lateral eyes separated by 0.4 their diameters. Total length 7.5 mm. Carapace 3.1 mm long, 2.5 wide. First femur 4 mm, patella and tibia 4, metatarsus 3.9, tarsus 1.3. Second patella and tibia 3.3 mm, third 1.8, fourth 2.8.

Male holotype. Reddish brown carapace, lighter around eyes, faint light marks extend posteriorly behind lateral eyes and median eyes (Fig. 218). Legs yellowish white, each article gradually turning reddish brown distally. Femur I with row of four or five macrosetae on anterior side; eight or nine on anteroventral side. Largest branches of fleur-de-lis pattern on dorsal folium form large paired white spots (Fig. 218). Venter of abdomen black with wide white median line, flanked by faint white U-shape mark (Fig. 219). Pair of small white spots on either side of spiracle. Sternum black with white posterior mark (Fig. 219). Ratio of eye diameters: posterior medians and anterior medians 1.0, anterior laterals 1.7, posterior laterals 1.4. Anterior median eyes separated by 1.8 diameters, posterior median eyes by 1.0, anterior median eyes separated from anterior laterals by 3.6 diameters of anterior lateral eyes, lateral eyes separated by 0.5 their diameters. Total length 5 mm. Carapace 2.5 mm long, 1.8 wide. First femur 4 mm, patella and tibia 4.2, metatarsus 4.5, tarsus 1.4. Second patella and tibia 3.3 mm, third 1.7, fourth 2.5.

Diagnosis. The male embolus of *M. atascadero* has a protruding bump between the embolus tip and the basal embolic apophysis (Figs. 214, 217) which separates it from all other *Metepeira* species. As with *M. incrassata* (Fig. 224) and, to a lesser degree, *M. triangularis* (Fig. 201), the epigynal depressions on either side of the scape of *M. atascadero* (Fig. 216) are sclerotized to create a scooped and slick quality. The darker epigynal openings inside the depressions are hidden anteriorly under the scape's hood. *Metepeira atascadero*'s epigynum differs from that of *M. incrassata* by its much smaller depressions (compare Fig. 216 with 224).

Variation. Average body length of 12 females examined 7.9 mm, range 6 to 9.5 mm. Average body length of 12 males examined 5.7 mm, range 3.5 to 6.9 mm.

Natural History. Mature specimens have been collected from the end of August to the end of October (Fig. 336). This species lives solitarily: only 20% of spiders live in aggregations of two or more individuals (Uetz and Hodge, 1990). It is thought that the low level of social behavior in *M. atascadero* occurs because the species pursues a risk-prone foraging strategy (Uetz, 1988a,b). Spiders are found between 1,500 and 2,500 m elevation.

Distribution. Mexican highlands from Durango to Guerrero (Map 14).

Records Examined. MEXICO *Coahuila*: Saltillo, 14 mi E in Larrea Desert, 25°25'N, 100°55'W, 28.vii.1944 (AMNH). *Durango*: El Tascate, 26°12'N, 105°7'W, 27.vii.1947 (W. J. Gertsch, AMNH); Yerbans, 80 mi NW Durango, 24°45'N, 103°50'W, 19.viii.1947 (W. J. Gertsch, AMNH). *Guanajuato*: 20 mi E. Guanajuato, 21°1'N, 100°57'W, 15.ix.1976 (C. E. Griswold & Jackson, CAS); Guanajuato, 21°1'N, 101°15'W (N. Banks, MCZ); San Miguel de Allende, 20°55'N, 100°45'W, 25.x.1982 (George Uetz, MCZ), 14.x.1983 (MCZ), 14.x.1985 (MCZ), 17.x.1985 (MCZ), 26.x.1985 (MCZ). *Guerrero*: Tecapulco, 25 km N Iguala, 18°29'N, 99°38'W, 1.i.1948 (AMNH). *Hidalgo*: Ozumbilla, 20°9'N, 101°16'W, 2.x.1957 (R. Dreisbach, MCZ). *Jalisco*: Cyarco Onda, 30 km W Ojuelos, 21°47'N, 101°53'W (H. Wagner, AMNH). *Michoacan*: Hills N of Pátzcuaro, 19°45'N, 101°36'W, 24.viii.1959 (A. F. Archer, AMNH); Hwy 110, 4 mi W Jiquilpan, 19°59'N, 102°47'W, 2.viii.1967 (R. E. Leeche, REL). *Zacatecas*: East of Guadalupe, 22°46'N, 102°31'W, 21.viii.1959 (A. F. Archer, AMNH); Guadalupe, 22°45'N, 102°31'W, 16.viii.1947 (W. J. Gertsch, AMNH).

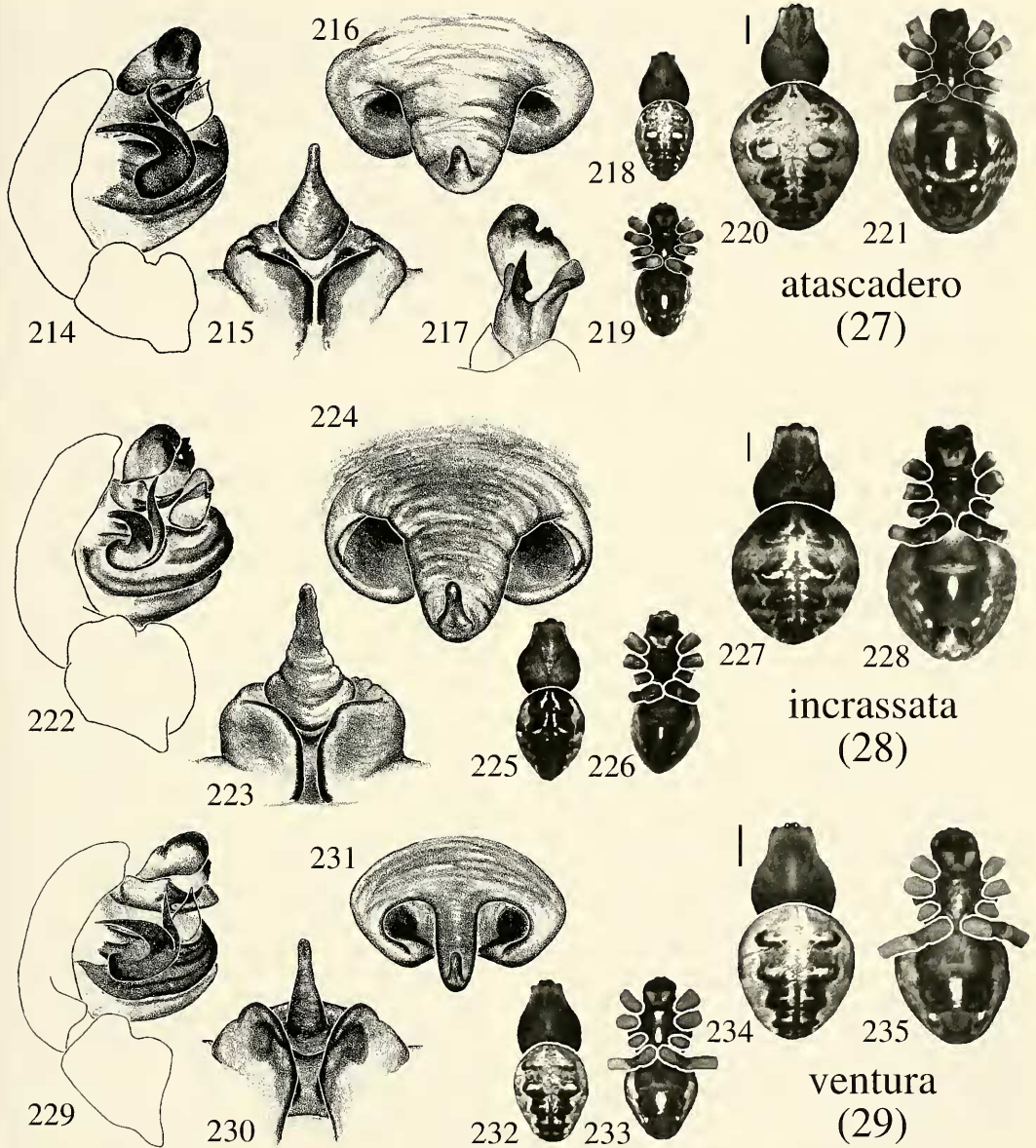
28. *Metepeira incrassata*

F. O. P.-Cambridge

Figures 222–228, 323; Map 9

Epeira Salèi Keyserling, 1864: 93, fig., ♂, ♀. Female holotype from Oaxaca, Mexico, in BMNH, examined. Keyserling, 1892: 196, fig. 145, ♀. Roewer, 1942: 851. NEW SYNONYMY.

Metepeira incrassata F. O. P.-Cambridge, 1904: 460, fig. 11, ♀. Female holotype from Jalapa, Mexico, in BMNH. Roewer, 1942: 868. Bonnet, 1957: 2821.



Figures 214–221. *Metepeira atascadero* new species (sp. 27; 20°55'N, 100°45'W). 214, male palpus, mesal. 215, epigynum, posterior. 216, epigynum, ventral. 217, male embolic division, ventral. 218, male, dorsal. 219, male, ventral. 220, female, dorsal. 221, female, ventral.

Figures 222–228. *Metepeira incrassata* F. O. P.-Cambridge (sp. 28 [222,225–228] 19°4'N, 97°2'W; [223,224] 18°54'N, 97°0'W). 222, male palpus, mesal. 223, epigynum, posterior. 224, epigynum, ventral. 225, male, dorsal. 226, male, ventral. 227, female, dorsal. 228, female, ventral.

Figures 229–235. *Metepeira ventura* Chamberlin and Ivie (sp. 29; 28°5'N, 114°8'W). 229, male palpus, mesal. 230, epigynum, posterior. 231, epigynum, ventral. 232, male, dorsal. 233, male, ventral. 234, female, dorsal. 235, female, ventral.

Scale bars: dorsum and venter figures 1.0 mm.

Aranea sallei:—F.O.P.-Cambridge, 1904: 519. Roewer, 1942: 851.

Araneus incrassata:—Petrunkévitch, 1911: 289.

Araneus sallei:—Petrunkévitch, 1911: 314.

Metepeira salei:—Levi, 1991: 180. Platnick, 1993: 449.

Note. Although *M. incrassata* is not the oldest name, it has been cited more than 20 times in the general literature (e.g., Caraco et al. 1995; Hieber and Uetz, 1990; Hodge and Uetz, 1992, 1995, 1996; Jakob et al., 1996; Rayor, 1996; Rayor and Uetz, 1990, 1993; Uetz, 1988a,b, 1989, 1991, 1992, 1996; Uetz and Hieber, 1994, 1997; Uetz and Hodge, 1990; Uetz et al., 1994). In contrast, the senior synonym has not been cited outside of taxonomic catalogues. In compliance with Article 79 of the ICZN (1985), I choose to assert the priority of the more popular junior name.

Description. Female from Rancho Chula-Vista, Veracruz, Mexico. Brown carapace, darker around margins, lighter around eyes and behind lateral eyes (Fig. 227). Legs brown, yellow at base of articles and on articles distal to the femur for legs I and II. Femur I with row of three to four macrosetae on anterior side; one on anteroventral side. Dorsal folium darker than most *Metepeira* species. White fleur-de-lis pattern with thin branches (Fig. 227). Venter dark brown to black with white median mark that is shorter than it is in most other species (Fig. 228). Sternum dark brown to black with one or two small white spots, usually in the center or anteriorly (Fig. 228). Ratio of eye diameters: posterior medians and anterior medians 0.9, anterior laterals 1.3, posterior laterals 1.1. Anterior median eyes separated by 1.5 diameters, posterior median eyes by 1.1, anterior median eyes separated from anterior laterals by 4.1 diameters of anterior lateral eyes, lateral eyes separated by 0.5 their diameters. Total length 7.8 mm. Carapace 3.6 mm long, 2.9 wide. First femur 3.9 mm, patella and tibia 4.1, metatarsus 3.5, tarsus 1.4. Second patella and tibia 3.7 mm, third 2.3, fourth 3.3.

Male from Rancho Chula-Vista, Veracruz, Mexico. Carapace, dorsum, venter, sternum a darker version of female (Figs. 225, 226). Base of femora yellow, remainder dark brown; other articles gradually

turning lighter distally. Femur I with row of four to six macrosetae on anterior side; six to nine on anteroventral side. Ratio of eye diameters: posterior medians and anterior medians 1.0, anterior laterals 1.4, posterior laterals 1.2. Anterior median eyes separated by 1.4 diameters, posterior median eyes by 1.0, anterior median eyes separated from anterior laterals by 3.7 diameters of anterior lateral eyes, lateral eyes separated by 0.4 their diameters. Total length 7 mm. Carapace 3.3 mm long, 2.7 wide. First femur 4.9 mm, patella and tibia 5.3, metatarsus 4.8, tarsus 1.7. Second patella and tibia 4.3 mm, third 2.2, fourth 3.4.

Diagnosis. Overall pigmentation of *M. incrassata* is darker than all others in its species group. The thin branches on the dorsal folium (Figs. 225, 227), the almost entirely dark sternum, and the shortened median line on the venter (Figs. 226, 228) are distinctive. As with *M. olmec* (Fig. 178), *M. comanche* (Fig. 185), and *M. triangularis* (Fig. 199), the embolus of *M. incrassata* (Fig. 222) curves off sharply from a distal embolic apophysis that does not project forward. Compared to *M. olmec* (Fig. 178) and *M. comanche* (Fig. 185), *M. incrassata*'s embolus tip beyond the distal apophysis is relatively longer and not as curved (Fig. 222). Male *M. incrassata* are easily separated from *M. triangularis* by the shape of the median apophysis (compare Fig. 222 with Fig. 199). As with *M. atascadero* (Fig. 216) and, to a lesser degree, *M. triangularis* (Fig. 201), the epigynal depressions on either side of the scape of *M. incrassata* (Fig. 224) are sclerotized to create a scooped and slick quality. The darker epigynal openings inside the depressions are hidden anteriorly under the scape's hood. *Metepeira incrassata*'s epigynum differs from those of *M. atascadero* and *M. triangularis* by its much larger and disk-shaped depressions (compare Fig. 224 with Figs. 201, 216).

Variation. Average body length of 31 females examined 7.6 mm, range 6.4 to 9.1

mm. Average body length of 22 males examined 6.2 mm, range 4.3 to 8 mm.

Natural History. Mature specimens have been collected in February through October but are most frequently found in July (Fig. 323). This species lives socially: half of all spiders live in aggregations of 1,000 or more individuals (Uetz and Hodge, 1990). Colonies are frequently found spanning telephone lines, houses, fences, and other man-made structures. It is thought that this high level of social behavior occurs because the species pursues a risk-averse foraging strategy in which the variance in survival attenuates with increasing colony size (Uetz, 1988a,b). Elevations center around 800 m and range from about 500 to 1,500 m.

Distribution. Tropical Mexico from San Luis Potosí to southern Veracruz and Oaxaca (Map 9).

Records Examined. MEXICO *Hidalgo*: 20 mi S of Jacala, 20°50'N, 99°16'W, 18.iv.1946 (L. I. Davis & M. Johnston, AMNH); Chapulhuacán, 21°10'N, 98°54'W, 20.v.1952 (M. Cazier, W. Gertsch, & R. Schrammel, AMNH), 27.vii.1966 (Jean & Wilton Ivie, AMNH), 16.vii.1969 (S. & J. Peck, MCZ). *México*: 1 mi S Palomas, 19°50'N, 99°5'W, 28.vii.1950 (AMNH). *Oaxaca*: Oaxaca, 17°3'N, 96°43'W (Nathan Banks, MCZ). *Puebla*: Huachinango, 20°11'N, 98°3'W, 7.x.1947 (H. Wagner, AMNH); north of Xicotepéc de Juárez, 20°18'N, 97°57'W, 19.iv.1967 (W. B. Peck, MCZ). *San Luis Potosí*: 10 km W Xilitla on r120, 21°22'N, 99°4'W, 10.viii.1991 (W. H. Piel & G. S. Bodner, MCZ). *Veracruz*: 1 mi SW Tlapacoyan, 19°57'N, 97°14'W, 16.vii.1973 (A. Newton, MCZ); 2 mi N Fortín de las Flores, 18°56'N, 97°1'W, 5.viii.1966 (Jean & Wilton Ivie, AMNH); 5 mi E Orizaba, 18°51'N, 97°4'W, 25.vii.1956 (W. Gertsch & V. Roth, AMNH); Coatepec, 19°27'N, 96°58'W, 28.vii.1955 (C. & P. Vaurie, AMNH), 19.vii.1991 (W. H. Piel & G. S. Bodner, MCZ); Fortín de las Flores, 18°54'N, 97°0'W, 7.vii.1947 (G. & M. Goodnight, AMNH), 25.iv.1963 (W. J. Gertsch & W. Ivie, AMNH), 10.vii.1976 (A. Newton, MCZ), 21.x.1982 (George Uetz, MCZ), 17.vii.1991 (W. H. Piel & G. S. Bodner, MCZ); Jalapa, 19°32'N, 96°55'W, 14.ii.1948 (H. Wagner, AMNH), 15.iii.1948 (H. Wagner, AMNH), 15.x.1962 (N. L. H. Krauss, AMNH); Los Naranjos, 18°21'N, 96°10'W, 4.iii.1948 (H. Wagner, AMNH); near Monte Blanco, 18°58'N, 97°1'W, 3.viii.1973 (A. Newton, MCZ); Orizaba, 18°51'N, 97°4'W, 6.vii.1963 (D. Bixler, MCZ); Rancho Chula-Vista, N of Córdoba, 19°4'N, 97°2'W, 18.vii.1991 (W. H. Piel & G. S. Bodner, MCZ).

Metepeira ventura Group

Spiders in the *M. ventura* group (*Metepeira ventura*, *Metepeira revillagigedo*, *Metepeira celestun*, *Metepeira uncata*, *Metepeira crassipes*, *Metepeira chilapae*) are closely related to those in the *M. minima* group (*M. petatlan*, *M. minima*, *M. pacifica*, *M. jamaicensis*). Females in the *M. ventura* group have epigynal openings that are wider than long and shaped as triangles (Fig. 231), ovals (Fig. 252), or squares (Figs. 259, 266), with their posterior edges open. The posterior edges are observed to be open because the posterior lobes at their distal edge are wider than the distal end of the scape. In many other species, the gap between the lobes is narrower than the scape and therefore hidden from a ventral view, giving the impression that the openings form closed shapes (e.g., Fig. 123). In addition, with the exception of *M. celestun* (Fig. 245), the scape is relatively thin throughout its entire length (Figs. 231, 238, 252, 259, 266). In males, the embolus can be slim and elongated with a gentle curve (e.g., Figs. 236, 243), or as with some species in the *M. minima* group, it can be tapering to a sharp bend right at the tip (e.g., Figs. 229, 264). In general, the larger flagellum is a simple tapering extension off the base (Figs. 229, 243, 250, 257, 264, and to a lesser extent, Fig. 236), as opposed to being a distinctly separate structure that abruptly curves off the base (e.g., Fig. 129). Although the flagellae can be thin, as in the *M. minima* species group, they are not set off on a distinctly narrower stalk (e.g., compare Fig. 264 with Fig. 278).

29. *Metepeira ventura*

Chamberlin and Ivie

Figures 229–235, 320; Map 13

Metepeira ensenada Chamberlin and Ivie, 1942: 65, figs. 166–168, ♂. Male holotype from beach near Ensenada, Mexico, in the AMNH, examined. Synonymized by Levi (1977).

Metepeira ventura Chamberlin and Ivie, 1942: 67, figs. 175–179, ♀. Female holotype, 1 male and 3 female paratypes from between Oxnard and Santa Monica, California, USA, in the AMNH, examined.

Levi, 1977: 204, figs. 53–60. Brignoli, 1983: 275.

Note. As first reviser, Levi (1977) preferred to use the name *M. ventura* because a larger number of specimens were available from the type locality.

Description. Female from 10 mi north of Colonia Guerrero, Baja California Norte, Mexico. Carapace brown with white eye region, lateral posterior extensions, and white median line (Fig. 234). Legs yellowish tan with darker rings on fourth pair of legs. Femur I with row of four macrosetae on anterior side; two on anteroventral side. Dorsum of abdomen with usual *Metepeira* folium, lighter in anterior third (Fig. 234). Venter of abdomen with wide white median line posteriorly set within hint of surrounding U-shaped marking. Pair of white spots on either side of spiracle (Fig. 235). Sternum has wide median white line widening anteriorly, sometimes fragmented (Fig. 235). Ratio of eye diameters: posterior medians and anterior medians 1.0, anterior laterals 1.6, posterior laterals 1.4. Anterior median eyes separated by 1.4 diameters, posterior median eyes by 0.7, anterior median eyes separated from anterior laterals by 2.9 diameters of anterior lateral eyes, lateral eyes separated by 0.3 their diameters. Total length 5.5 mm. Carapace 2.8 mm long, 2.2 wide. First femur 3.3 mm, patella and tibia 3.3, metatarsus 3, tarsus 1.2. Second patella and tibia 2.9 mm, third 1.7, fourth 2.5.

Male from 10 mi north of Colonia Guerrero, Baja California Norte, Mexico. Carapace, abdomen, venter as in female (Figs. 232, 233). Ringed legs darker than in female. Femur I with row of four macrosetae on anterior side; six to seven on anteroventral side. Median white line on sternum often broken (Fig. 233). Ratio of eye diameters: posterior medians and anterior medians 0.9, anterior laterals 1.2, posterior laterals 1.1. Anterior median eyes separated by 1.6 diameters, posterior median eyes by 0.8, anterior median eyes separated from anterior laterals by 1.9 diameters of anterior lateral eyes, lateral eyes separated by 0.3 their diameters. Total length 4.3 mm. Carapace 2.2 mm long,

1.7 wide. First femur 3.6 mm, patella and tibia 3.6, metatarsus 3.7, tarsus 1.3. Second patella and tibia 2.8 mm, third 1.5, fourth 2.3.

Diagnosis. Unlike other members of the *M. minima* species group, the larger flagellum on the median apophysis of *M. ventura* is a tapering extension off the base (Fig. 229), as opposed to arising from a distinctly separate stalk (Fig. 286). Like *M. uncata*, the epigynal openings of *M. ventura* (Fig. 231) are somewhat triangular in shape, in contrast to oval (Fig. 288) or slit-shaped (Fig. 280) as in other members of the *M. minima* species group. The relatively shorter scape and the dark circles inside the epigynal openings of *M. ventura* (Fig. 231) contrast with *M. uncata*'s relatively longer scape and the dark sinuous shapes inside the epigynal openings (Fig. 252).

Variation. Average body length of eight females examined 6.7 mm, range 5.6 to 9.7 mm. Average body length of seven males examined 5.1 mm, range 3.9 to 7 mm.

Natural History. Mature specimens are mostly collected April through September (Fig. 320). Altitudes range from near sea level to 1,000 m.

Distribution. California to northwestern Mexico (Levi, 1977, map 1; Map 13).

Records Examined. MEXICO *Baja Calif. Norte:* 10 mi E El Rosario, 30°11'N, 115°46'W, 8.vii.1973 (S. C. Williams & K. B. Blair, CAS); 10 mi N Col. Guerrero, 28°5'N, 114°8'W, 1.ix.1957 (V. Roth, AMNH); 2 mi SE Eréndira, 31°19'N, 116°19'W, 12.v.1973 (S. C. Williams & K. B. Blair, CAS); Isla Cedros, Gran Cañon, 28°12'N, 115°15'W, 10.iii.1945 (B. F. Osorio Taffall, AMNH); Isla de Cedros, Cerro de Cedros, 28°12'N, 115°15'W, 1.vii.1983 (V. F. Lee, CAS); Isla de Cedros, Punta Norte [?], 28°22'N, 115°14'W, 3.vii.1983 (V. F. Lee, CAS); Isla de Cedros, trail to Cerro de Cedros, at spring, 28°12'N, 115°15'W, 27.ix.1984 (D. B. Weissman, V. F. Lee, CAS); Islas San Benito, Benitos del Oeste, 28°18'N, 115°35'W, 4.vii.1983 (D. C. Lightfoot & V. F. Lee, CAS); Islas San Benito, Middle Island, 28°19'N, 115°34'W, 9.iv.1981 (Stanley C. Williams, CAS); Islas San Benito, South Island, 28°18'N, 115°35'W, 9.iv.1981 (Stanley C. Williams, CAS); near Consuelo, 6 mi NW El Rosario, 30°11'N, 115°46'W, 18.iv.1965 (D. Q. Cavagnaro, C. E. & E. S. Ross, V. L. Vesterby, CAS); Rancho Las Parritas, 10 mi S San Quintin, 30°20'N,

115°57'W, 27.vi.1977 (C. E. Griswold, CAS); Santo Tomás, 31°33'N, 116°24'W, 8.vii.1953 (W. J. & J. W. Gertsch, AMNH). *Baja Calif. Sur*: Bahía de los Muertos, 23°58'N, 109°50'W, 20.xii.1958 (H. B. Leech, CAS); Desierto del Vizcaino, Laguna Ojo de Liebre, sobre frutilla, 27°43'N, 114°15'W, 11.xi.1981 (A. Cota & M. Jiménez, MLJ); E edge of Sierra Placeres, 27°35'N, 114°30'W, 25.iii.1984 (W. J. Pulawski, CAS). *Sonora*: 6 mi E Navojoa, 27°6'N, 109°23'W, 23.viii.1965 (W. J. Gertsch & R. Hastings, AMNH). *USA California*: 1 mi NW Winchester (Double Butte), 33°43'N, 117°6'W, 7.xii.1976 (W. Icenogle, MCZ); Lompoc, by US 63, 34°38'N, 120°27'W, 17.viii.1966 (L. & P. Pinter, MCZ); Lucia, Monterey Co., 36°1'N, 121°33'W, 15.ix.1964 (L. Pinter, MCZ); Manzanita chaparral, San Gabriel Canyon, Coldbrook Ranger Station, 34°11'N, 117°53'W, 29.v.1965 (L. Pinter, MCZ); Santa Catalina Island Area near Haypress Res, 33°23'N, 118°25'W, 6.ii.1993 (Martin G. Ramirez & Laura B. Fandino, MCZ); Santa Catalina Island, Mt. Torquemada, 33°26'N, 118°33'W, 15.viii.1965 (L. Pinter, MCZ); Winchester, 33°42'N, 117°5'W, 11.v.1970 (W. Icenogle, MCZ); Winchester, Double Butte, 33°42'N, 117°5'W, 19.v.1974 (W. Icenogle, MCZ). *Nevada*: Quin River Crossing, 41°35'N, 118°27'W, 21.vi.1975 (G. F. Knowlton, MCZ).

30. *Metepeira revillagigedo* new species Figures 236–242, 301; Map 12

Holotype. Female from south of Isla Socorro, Archipiélago de Revillagigedo, State of Colima, Mexico, 15.xii.1988, M. Jiménez, in MCZ. The specific name is a noun in apposition after the locality.

Description. Female holotype. Carapace dark brown with light region in median eye quadrangle and surrounding lateral eyes. Pair of darker, elliptic, walnut leaf shapes on lighter patch near center of carapace (see Fig. 241). Darker rings on distal ends of femora, patellae, tibiae, and proximal dorsal portion of tibia I, II. Femur I with three to four macrosetae on anterior side; none on the anteroventral side. Dorsum of abdomen with white oak leaf folium, margined with dark markings, particularly on trailing edges of lobes (Fig. 241). Coloration has a slightly golden hue. Dark lateral band wraps around sides of abdomen and stretches up over anterior dorsal portion. Venter with two white spots on either side of spiracle. Anterior to spiracle, slight indication of a V-shaped mark with longitudinal extensions reaching halfway up abdomen. Wide, white medial longitu-

dinal line to epigynal groove (Fig. 242). Sternum with wide, white longitudinal mark widening anteriorly (Fig. 242). Ratio of eye diameters: posterior medians and anterior medians 0.8, anterior laterals 1.1, posterior laterals 1. Anterior median eyes separated by 1.3 diameters, posterior median eyes by 1.0, anterior median eyes separated from anterior laterals by 2.5 diameters of anterior lateral eyes, lateral eyes separated by 0.3 their diameters. Total length 7.5 mm. Carapace 3.2 mm long, 2.5 wide. First femur 3.5 mm, patella and tibia 3.8, metatarsus 3.2, tarsus 1.2. Second patella and tibia 3.2 mm, third 1.8, fourth 2.8.

Male paratype from Isla Socorro, Colima. Carapace dirty yellowish brown with lighter posteriorly pointing acute triangle in center (Fig. 239). Legs same color as carapace, except lighter on proximal half of femora. Femur I with row of four macrosetae on anterior side, row of two macrosetae on anteroventral side. Male abdomen lighter and with less contrast than female (Fig. 239). Venter with a much reduced and shorter longitudinal line than female. Sternum as in female, except longitudinal line more often broken (Fig. 240). Ratio of eye diameters: posterior medians and anterior medians 1.0, anterior laterals 1.1, posterior laterals 1.1. Anterior median eyes separated by 1.5 diameters, posterior median eyes by 0.8, anterior median eyes separated from anterior laterals by 1.4 diameters of anterior lateral eyes, lateral eyes separated by 0.3 their diameters. Total length 3.2 mm. Carapace 1.7 mm long, 1.1 wide. First femur 2.5 mm, patella and tibia 2.5, metatarsus 2.3, tarsus 0.9. Second patella and tibia 2 mm, third 1.0, fourth 1.5.

Diagnosis. The epigynum of *M. revillagigedo* looks very different from those of other species in the *M. ventura* group. Instead of having small, sharply delineated depressions on either side of the scape (e.g., Fig. 259), *M. revillagigedo* has larger but more gradual depressions (Fig. 238). Despite the unique appearance of the epi-

gynum, the affinity between *M. revillagigedo* and the *M. ventura* species group can be seen in the black comma-shaped marks inside the epigynal depressions (Fig. 238) similar to those in, for example, *M. ventura* (Fig. 231). The male emboli of *M. revillagigedo* (Fig. 236) and *M. celestun* (Fig. 243) are very similar in shape and relatively longer than in other species in the *M. ventura* group. Males of *M. revillagigedo* differ from males of *M. celestun* by the thickness and shape of the median apophysis (compare Fig. 236 with Fig. 243).

Natural History. Specimens have only twice been collected: once in December and once in April (Fig. 301). This species is known to live in fig trees.

Distribution. This species is found on Isla Socorro in the Pacific Ocean (Map 12), the island being one of several that form the Archipiélago de Revillagigedo. It is well isolated, situated about 465 km south of Baja California Sur and 588 km west of the Jalisco coastline.

Records Examined. MEXICO Colima: Archipiélago de Revillagigedo: Isla Socorro, 18°45'N, 110°57'W, 26.iv.1932 (Templeton, Crocker Exped., CAS); Archipiélago de Revillagigedo: Sur de la Isla Socorro, 18°44'N, 110°57'W, 15.xii.1988 (M. Jiménez, MCZ).

31. *Metepeira celestun* new species Figures 243–249, 326; Map 13

Holotype. Male from Celestun, Yucatan, Mexico, 24.vii.1991, W. H. Piel & G. S. Bodner, in MCZ. The specific name is a noun in apposition after the locality.

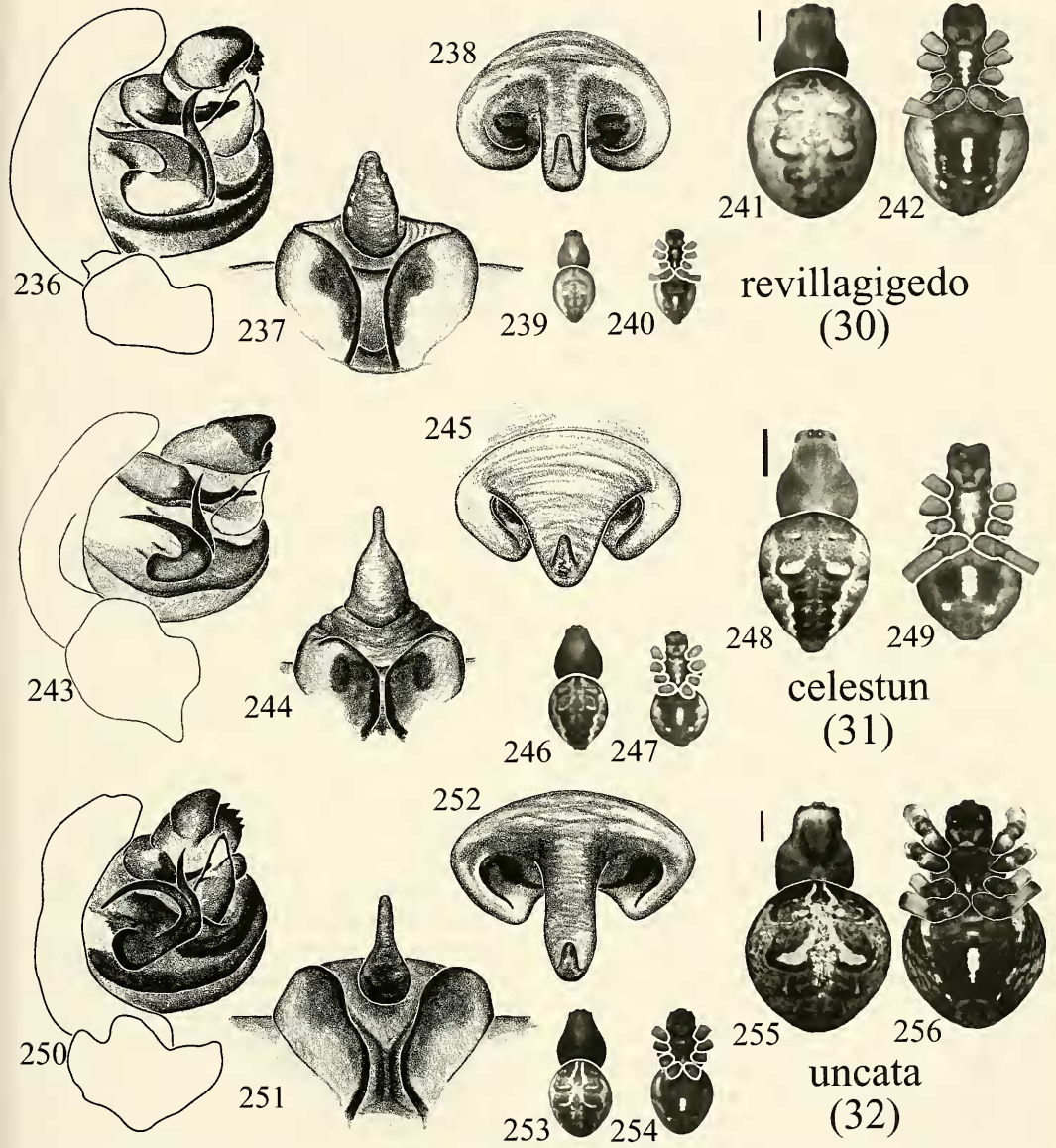
Note. Since males of this species were never found with females, one cannot be sure absolutely that they are conspecific. Several facts argue for conspecificity: all specimens were collected in similar habitats and during the same season; dorsal folium of males and females share similar patterns and both have hint of gold coloration; based on parallel correspondence with other species, the male palp is arguably compatible with the female's epigynum.

Description. Female paratype from Edzna, Campeche, Mexico. Carapace yellowish tan with lighter area around eyes (Fig. 248). Legs yellowish tan with darker rings on fourth pair of legs. Femur I with

row of four macrosetae on anterior side; sometimes four on anteroventral side. Dorsal folium as in other *Metepeira*, except speckled an unusual reddish gold color (Fig. 248). Venter wide white median line with pair of large white spots on either side of spiracle (Fig. 249). Sternum has wide median white line widening anteriorly with constriction in center (Fig. 249). Ratio of eye diameters: posterior medians and anterior medians 1.0, anterior laterals 1.3, posterior laterals 1.2. Anterior median eyes separated by 1.5 diameters, posterior median eyes by 0.9, anterior median eyes separated from anterior laterals by 2.4 diameters of anterior lateral eyes, lateral eyes separated by 0.2 their diameters. Total length 5.2 mm. Carapace 2.5 mm long, 1.9 wide. First femur 2.6 mm, patella and tibia 2.8, metatarsus 2.2, tarsus 0.9. Second patella and tibia 2.4 mm, third 1.4, fourth 2.

Male holotype. Carapace dark with light region around eyes and a light triangular mark anterior to thoracic furrow (Fig. 246). Coxae and proximal third of femora white, remaining two-thirds black; other articles similarly ringed. Femur I with row of four macrosetae on anterior side; three on anteroventral side. Dorsal folium with slight gold iridescence. Fleur-de-lis pattern leafy and pinnate (Fig. 246). Venter, sternum as in female, except median white line on sternum often broken (Fig. 247). Ratio of eye diameters: posterior medians and anterior medians 1.1, anterior laterals 1.4, posterior laterals 1.3. Anterior median eyes separated by 1.6 diameters, posterior median eyes by 0.9, anterior median eyes separated from anterior laterals by 1.4 diameters of anterior lateral eyes, lateral eyes separated by 0.2 their diameters. Total length 2.8 mm. Carapace 1.4 mm long, 1.1 wide. First femur 1.8 mm, patella and tibia 1.8, metatarsus 1.4, tarsus 0.8. Second patella and tibia 1.5 mm, third 0.8, fourth 1.2.

Diagnosis. The overall coloration of *M. celestun* in alcohol has an unusually golden quality that is rare among preserved *Me-*



Figures 236–242. *Metepeira revillagigedo* new species (sp. 30; 18°44'N, 110°57'W). 236, male palpus, mesal. 237, epigynum, posterior. 238, epigynum, ventral. 239, male, dorsal. 240, male, ventral. 241, female, dorsal. 242, female, ventral.
 Figures 243–249. *Metepeira celestun* new species (sp. 31 [243,246,247] 20°56'N, 90°21'W; [244,245,248,249] 19°35'N, 90°15'W). 243, male palpus, mesal. 244, epigynum, posterior. 245, epigynum, ventral. 246, male, dorsal. 247, male, ventral. 248, female, dorsal. 249, female, ventral.
 Figures 250–256. *Metepeira uncata* F. O. P.-Cambridge (sp. 32 [250,251,253–256] 14°40'N, 92°9'W; [252] 14°49'N, 91°31'W). 250, male palpus, mesal. 251, epigynum, posterior. 252, epigynum, ventral. 253, male, dorsal. 254, male, ventral. 255, female, dorsal. 256, female, ventral.
 Scale bars: dorsum and venter figures 1.0 mm.

tepeira. Unlike all other members of the *M. ventura* species group, the scape of *M. celestun* is very wide at its base, thereby partly concealing the epigynal openings (Fig. 245). However, if the scape is discarded, the exposed openings have black comma-shaped marks similar to those of *M. ventura* (Fig. 231), thereby confirming the species' affinities with other members in the *M. ventura* species group. Unlike other members, the posterior lobes nearly touch each other near their base (Fig. 244). The emboli of *M. celestun* and *M. revillagigedo* are very similar in shape and relatively longer than in other species in the *M. ventura* group (Fig. 243). *Metepeira celestun* differs from *M. revillagigedo* by the thickness and shape of the median apophysis (compare Fig. 243 with Fig. 236).

Variation. Average body length of four females examined 5.6 mm, range 5.2 to 6.4 mm. Average body length of three males examined 2.7 mm, range 2.2 to 2.9 mm. Female scape sometimes wider than it appears in Fig. 245, resembling *Metepeira arizonica*. Legs and carapace color vary from yellowish tan to orange-red.

Natural History. Mature specimens have been collected in July (Fig. 326) in forested clearings, roadside bushes, palms, and swampy areas near the beach.

Distribution. Yucatan peninsula (Map 13).

Records Examined. MEXICO *Campeche*: Edzna, 19°35'N, 90°15'W, 22.vii.1991 (W. H. Piel & G. S. Bodner, MCZ). *Quintana Roo*: Kohunlich ruins, 9 km S Francisco Villa, 18°26'N, 88°48'W, 15.vii.1983 (R. S. Anderson, MCZ). *Yucatan*: 3 km S San Felipe, 21°32'N, 88°14'W, 25.vii.1991 (W. H. Piel & G. S. Bodner, MCZ); 4 km N Xocenpich, 12 km N Piste, on road to Dzitas, 20°47'N, 88°34'W, 20.vii.1983 (W. Maddison, MCZ); Balankanche Cave, 2 km E Chichen Itza, 20°40'N, 88°33'W, 19.vii.1983 (W. Maddison, MCZ); beach north of Celestún, 20°56'N, 90°21'W, 24.vii.1991 (W. H. Piel & G. S. Bodner, MCZ); Chichen Itza ruins on HWY 180, seasonal forest, 20°40'N, 88°34'W, 19.vii.1983 (W. Maddison & R. S. Anderson, MCZ); Uxmal, 20°22'N, 89°46'W, 23.vii.1991 (W. H. Piel & G. S. Bodner, MCZ).

32. *Metepeira uncata*

F. O. P.-Cambridge

Figures 250–256, 329; Map 12

Metepeira uncata F. O. P.-Cambridge, 1903: 459, fig. 8, ♂. Male holotype from Santa Ana, Guatemala, in BMNH. Roewer, 1942: 868. Bonnet, 1957: 2823. *Araneus uncatus*:—Petrunkovitch, 1911: 321.

Description. Female from Ayutla, San Marcos, Guatemala. Carapace dark brown with light region surrounding the eyes and extending posteriorly behind the lateral eyes. Pair of darker feather-shaped patches anterior of thoracic furrow, touching posteriorly to create a U-shape (see Fig. 255). Dark rings on distal half of leg articles, anterior side of patellae, and dark markings on dorsal, proximal end of tibia I and II. Femur I with four macrosetae on anterior side; one on anteroventral side. Dorsum of abdomen with white fleur-de-lis folium; this pattern thinner than in most other species. Fleur-de-lis pattern on a dark background, outlined on either side by thin white stripe (Fig. 255). Dark lateral band follows sides of abdomen and stretches up over anterior dorsal portion. Venter with two white spots on each side of spiracle; wide, white, medial longitudinal line starts anterior to the colulus and ends posterior to the epigynal groove. Thin, faint lines run parallel to wide median one anterior to white spots. White patch separates epigynum and dark depression posterior to pedicel (Fig. 256). Sternum black with white dewdrop-shaped mark at posterior end (Fig. 256). Ratio of eye diameters: posterior medians and anterior medians 1.0, anterior laterals 1.3, posterior laterals 1.2. Anterior median eyes separated by 1.6 diameters, posterior median eyes by 1.1, anterior median eyes separated from anterior laterals by 4 diameters of anterior lateral eyes, lateral eyes separated by 0.4 their diameters. Total length 7.8 mm. Carapace 3.7 mm long, 2.9 wide. First femur 4 mm, patella and tibia 4.3, metatarsus 3.8, tarsus 1.4. Second patella and tibia 3.6 mm, third 2.3, fourth 3.2.

Male from Ayutla, San Marcos, Guatemala. Carapace dirty yellowish brown with lighter mark in center (Fig. 253). Same color as carapace except lighter on proximal half of femora. Femur I with row of nine macrosetae on anterior side; five on anteroventral side. Male abdomen similar to female, but leaves of fleur-de-lis pattern thinner (Fig. 253). Venter with a shorter longitudinal line, as compared with female (Fig. 254). Sternum with posterior white dewdrop as in female, and additional anterior white mark near labium (Fig. 254). Ratio of eye diameters: posterior medians and anterior medians 0.9, anterior laterals 1.3, posterior laterals 1.3. Anterior median eyes separated by 1.5 diameters, posterior median eyes by 1.0, anterior median eyes separated from anterior laterals by 2 diameters of anterior lateral eyes, lateral eyes separated by 0.3 their diameters. Total length 4.5 mm. Carapace 2.3 mm long, 1.8 wide. First femur 3.4 mm, patella and tibia 3.4, metatarsus 3.2, tarsus 1.1. Second patella and tibia 2.7 mm, third 1.4, fourth 2.

Diagnosis. The generally darker pigmentation (Fig. 255) and the small white mark on the sternum (Fig. 256) separate *M. uncata* from all other members of the *M. ventura* species group. Like *M. ventura* (Fig. 231) but unlike other members of the *M. ventura* species group, the openings to the epigynum are more triangular to oval (Fig. 252), rather than square (Figs. 259, 266). Also distinctive are the sinuous black lines that form upside-down U-shapes inside each epigynal opening (Fig. 252), in contrast to the comma-shaped marks in *M. ventura* or *M. chilapae* (Figs. 231, 266). Like *M. chilapae* but unlike other members of the *M. ventura* group, the median apophysis and flagellae of *M. uncata* are slimmer and of uniform thickness (Figs. 250, 264). The palp of *M. uncata* differs from that of *M. chilapae* by the more basal position of the bend in the embolus tip (compare Fig. 250 with Fig. 264).

Variation. Average body length of five females examined 8.2 mm, range 7.5 to 8.8

mm. Average body length of four males examined 5.6 mm, range 4.5 to 6.4 mm.

Natural History. Mature specimens have been collected in August (Fig. 329).

Distribution. Southwestern Guatemala to northern Costa Rica (Map 12) at altitudes ranging from 100 to 3,000 m.

Records Examined. COSTA RICA *Cordillera*: 20 km N Siquires, 10°9'N, 84°17'W, 15.viii.1980 (W. Eberhard, MCZ). GUATEMALA *El Quiche*: Chichicastenango, 14°56'N, 91°7'W, 6.viii.1947 (C. & P. Vaurie, AMNH). *Huehuetenango*: Todos Santos Cuchumatán, 15°31'N, 91°37'W, 16.viii.1979 (C. E. Griswold, CAS). *Quetzaltenango*: El Baul, 1 km S Quetzaltenango, 14°49'N, 91°31'W, 14.viii.1979 (T. C. Meikle & C. E. Griswold, CAS); Quetzaltenango, 14°50'N, 91°31'W, 16.viii.1950 (C. J. & M. Goodnight, AMNH). *San Marcos*: Ayutla, 14°40'N, 92°9'W, 19.viii.1947 (AMNH).

33. *Metepeira crassipes*

Chamberlin and Ivie

Figures 257–263, 309; Map 12

Metepeira josepha Chamberlin and Ivie, 1942: 64, fig. 165, ♀. Female holotype from Kings Mtn. near Palo Alto, California in the AMNH. Synonymized by Levi (1977).

Metepeira crassipes Chamberlin and Ivie, 1942: 66, figs. 171–173, ♀, ♂. Male holotype, female, male paratypes from Laguna Beach, California in the AMNH. Levi, 1977: 202, figs. 47–52, ♀, ♂.

Note. As first reviser, Levi (1977) preferred to use name *M. crassipes*.

Description. Female from Isla San Pedro Nolasco, Sonora, Mexico. Carapace with large white eye region and lateral posterior extensions (Fig. 262). Legs ringed at distal ends of articles—though sometimes only lightly. Femur I with four macrosetae on anterior side aligned in straight row; one to four light setae on anteroventral side. Dorsum of abdomen with usual *Metepeira* folium (Fig. 262); venter wide, with long white median line set within U-shaped thinner white lines. Pair of white spots on either side of spiracle (Fig. 263). Sternum black with wide median white line widening anteriorly (Fig. 263). Ratio of eye diameters: posterior medians and anterior medians 1.1, anterior laterals 1.4, posterior laterals 1.3. Anterior median eyes separated by 1.4 diameters,

posterior median eyes by 0.8, anterior median eyes separated from anterior laterals by 3 diameters of anterior lateral eyes, lateral eyes separated by 0.1 their diameters. Total length 5.7 mm. Carapace 2.8 mm long, 2.1 wide. First femur 3.2 mm, patella and tibia 3.1, metatarsus 2.8, tarsus 1. Second patella and tibia 2.7 mm, third 1.6, fourth 2.5.

Male from Winchester, California. Carapace as in female except often with median white mark. Femur I with row of four macrosetae on anterior side; about four to eight on anteroventral side. Dorsum, venter as in female (Fig. 260); median white line on sternum more often broken (Fig. 261). Ratio of eye diameters: posterior medians and anterior medians 1.0, anterior laterals 1.6, posterior laterals 1.4. Anterior median eyes separated by 1.2 diameters, posterior median eyes by 0.6, anterior median eyes separated from anterior laterals by 2 diameters of anterior lateral eyes, lateral eyes separated by 0.3 their diameters. Total length 4 mm. Carapace 2.1 mm long, 1.5 wide. First femur 3.2 mm, patella and tibia 3.2, metatarsus 3.2, tarsus 1.1. Second patella and tibia 2.5 mm, third 1.3, fourth 2.

Diagnosis. Unlike other species in the *M. ventura* species group, the openings to the epigynum of *M. crassipes* resemble those of *M. chilapae* because they are shaped like squares with rounded edges (compare Fig. 259 with Fig. 266). However, compared to *M. chilapae*, the epigynal openings of *M. crassipes* are relatively smaller and the scape is relatively longer. The embolus of *M. crassipes* is distinguished by its gentle curvature (Fig. 257), in contrast to much more abrupt curvature seen in other species in the *M. ventura* group (e.g., Fig. 264), with the exception of *M. revillagigedo*. The median apophysis of *M. crassipes* (Fig. 257) is slimmer than that of *M. revillagigedo* (Fig. 236).

Variation. Average body length of four females examined 6 mm, range 5 to 6.5 mm. Average body length of two males examined 4.4 mm, range 4.1 to 4.7 mm.

Sometimes the scape is greatly swollen, adding to its relative width. In such cases the scape can cover the epigynal openings, which may mislead the investigator to confuse it for *Metepeira arizonica*.

Natural History. Levi (1977) reports that males in the U.S. have been collected from April to October, primarily in California buckwheat and sage. Mexican records expand this seasonality to include the entire year (Fig. 309).

Distribution. From northern California in the U.S. to Baja California Sur, Mexico (Levi, 1977, map 1; Map 12).

Records Examined. MEXICO *Baja Calif. Norte:* Santo Tomás, 31°33'N, 116°24'W, 8.vii.1953 (W. J. & J. W. Gertsch, AMNH), 12.xi.1976 (S. C. Williams & K. B. Blair, CAS). *Baja Calif. Sur:* 26 mi S Loreto, 25°37'N, 111°17'W, 1.i.1977 (C. E. Griswold & L. Vincent, CAS); Isla Magdalena, Puerto Magdalena, 24°38'N, 112°9'W, 16.iii.1957 (R. Zweifel, AMNH); Isla San Francisco, South Side, 24°50'N, 110°35'W, 19.v.1970 (S. C. Williams & V. F. Lee, CAS); Sierra San Nicolas, 26°32'N, 111°36'W [?], (Eisen & Vaslit, MCZ). *Sonora:* Isla San Pedro Nolasco, 27°58'N, 111°25'W, 17.iv.1921 (G. C. Chamberlin, MCZ); Sierra de Alamos, 30°51'N, 112°2'W [?], 19.i.1968 (V. Roth, AMNH). *USA California:* 1 mi NW Winchester (Double Butte), in web between *Artemisia californica* bushes, 33°43'N, 117°6'W, 4.xii.1976 (W. Icenogle, MCZ).

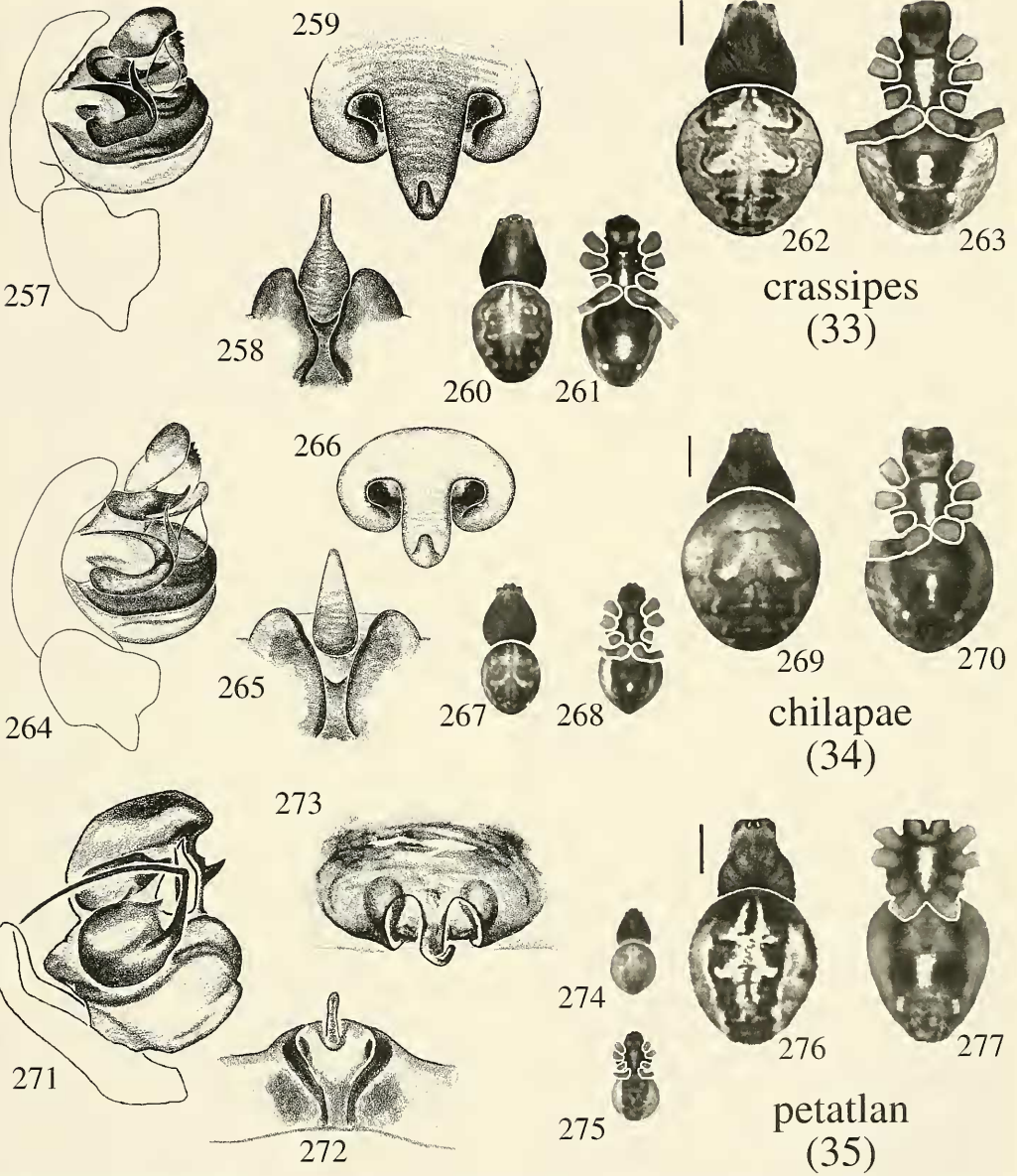
34. *Metepeira chilapae* Chamberlin and Ivie

Figures 264–270, 333; Map 13

Metepeira chilapae Chamberlin and Ivie, 1936: 45, figs. 119–121, ♂. Male holotype from Chilapa, Guerrero, Mexico, in the ZMB. Roewer, 1942: 868. *Metepeira chilapica*:—Bonnet, 1957: 2820. Unjustified emendation.

Note. Examination of Chamberlin and Ivie's (1936) and Levi's (personal illustrations) figures of the holotype was sufficient to identify *M. chilapae* accurately.

Description. Female from Cocoyoc, Morelos, Mexico. Brownish black carapace, paler around and just posterior to lateral eyes (Fig. 269). Distal halves of ventral leg articles black, elsewhere yellowish. Femur I with row of four macrosetae on anterior side; zero to three setae on anteroventral side. Dorsal folium a white fleur-de-lis marking set on golden-



Figures 257–263. *Metepeira crassipes* Chamberlin and Ivie (sp. 33 [257–261] 33°43'N, 117°6'W; [262,263] 27°58'N, 111°25'W). 257, male palpus, mesal. 258, epigynum, posterior. 259, epigynum, ventral. 260, male, dorsal. 261, male, ventral. 262, female, dorsal. 263, female, ventral.

Figures 264–270. *Metepeira chilapae* Chamberlin and Ivie (sp. 34 [264] 17°39'N, 99°22'W; [265–270] 17°39'N, 99°22'W). 264, male palpus, mesal. 265, epigynum, posterior. 266, epigynum, ventral. 267, male, dorsal. 268, male, ventral. 269, female, dorsal. 270, female, ventral.

Figures 271–277. *Metepeira petatlan* new species (sp. 35 [271,274,275] 17°14'N, 100°53'W; [272,273,276,277] 17°17'32"N, 101°2'40"W). 271, male palpus, mesal. 272, epigynum, posterior. 273, epigynum, ventral. 274, male, dorsal. 275, male, ventral. 276, female, dorsal. 277, female, ventral.

Scale bars: dorsum and venter figures 1.0 mm.

brown speckled pattern over white. Folium darkens posteriorly (Fig. 269). Anterior shoulders black. Venter black with wide median white line and pair of white spots on either side of spiracle (Fig. 270). Sternum brownish black with wide, white line widening anteriorly (Fig. 270). Ratio of eye diameters: posterior medians and anterior medians 1.0, anterior laterals 1.1, posterior laterals 1.1. Anterior median eyes separated by 1.3 diameters, posterior median eyes by 0.8, anterior median eyes separated from anterior laterals by 2.2 diameters of anterior lateral eyes, lateral eyes separated by 0.2 their diameters. Total length 5.8 mm. Carapace 2.7 mm long, 2.3 wide. First femur 2.9 mm, patella and tibia 3, metatarsus 2.6, tarsus 1. Second patella and tibia 2.4 mm, third 1.6, fourth 2.3.

Male from 6 mi northeast of Tixtla de Guerrero, Guerrero, Mexico. Carapace, dorsum, venter, sternum darker and more contrasty version of female (Figs. 267, 268). Distal halves of ventral leg articles black, elsewhere yellowish. Femur I with row of four macrosetae on anterior side; three on anteroventral side. Ratio of eye diameters: posterior medians and anterior medians 1.0, anterior laterals 1.3, posterior laterals 1.3. Anterior median eyes separated by 1.7 diameters, posterior median eyes by 0.9, anterior median eyes separated from anterior laterals by 1.9 diameters of anterior lateral eyes, lateral eyes separated by 0.3 their diameters. Total length 3.5 mm. Carapace 1.8 mm long, 1.4 wide. First femur 2.3 mm, patella and tibia 2.1, metatarsus 1.8, tarsus 0.8. Second patella and tibia 1.8 mm, third 0.9, fourth 1.4.

Diagnosis. The openings to the epigynum resemble those of *M. crassipes* because they are shaped like squares with rounded edges (compare Fig. 266 with Fig. 259). However, the dark, comma-shaped mark inside each opening resembles that of *M. ventura* (compare Fig. 266 with Fig. 231). As in *M. ventura* (Fig. 229) but unlike all other species in the *M. ventura* species group, the embolus tapers

strongly then curves sharply up and inward right at the tip (Fig. 264). The bend in the embolus in other *M. ventura* group species is less pronounced (Figs. 236, 257) or not so near the tip (Figs. 243, 250). Unlike *M. ventura*, the median apophysis in *M. chilapae* is slimmer (Fig. 264) and the separation between the embolus and the basal embolic apophysis is relatively greater.

Variation. Average body length of eight females examined 6.5 mm, range 5.7 to 8.3 mm. Average body length of three males examined 2.9 mm, range 2.3 to 3.5 mm.

Natural History. Mature specimens have been collected in July through October (Fig. 333).

Distribution. Southern Mexican states between Nayarit and Oaxaca; elevations from 1,000 to 2,000 m (Map 13).

Records Examined. MEXICO Guerrero: 6 mi NE Tixtla de Guerrero, 17°39'N, 99°22'W, 16.vii.1984 (J. B. Woolley, ADC). Morelos: Cocoyoc, 18°52'N, 98°59'W, 28.vii.1956 (W. Gertsch & V. Roth, AMNH); Cuernavaca, 18°55'N, 99°15'W, 15.x.1944 (N. L. H. Krauss, AMNH). Nayarit: 30 mi SE Tepic, 21°12'N, 104°33'W, 23.xi.1948 (E. S. Ross, CAS); 5 mi NW Tepic, 21°32'N, 104°57'W, 13.v.1963 (W. J. Gertsch & W. Ivie, AMNH). Oaxaca: 6 mi NE Mitla, 16°59'N, 96°21'W, 20.viii.1985 (J. Woolley & G. Zolnerowich, ADC); Huajuapán, 17°48'N, 97°46'W, 1.x.1946 (H. Wagner, AMNH); Oaxaca, 17°3'N, 96°43'W, 17.vii.1955 (C. & P. Vaurie, AMNH), 12.viii.1991 (W. H. Piel & G. S. Bodner, MCZ); San Balt. Chichicapan, 16°45'N, 96°29'W, 4.viii.1991 (W. H. Piel & G. S. Bodner, MCZ).

Metepeira minima Group

Female spiders in the *M. minima* group (*Metepeira petatlan*, *Metepeira minima*, *Metepeira pacifica*, *Metepeira jamaicensis*) have a thin scape with epigynal openings that are shaped from longitudinal slits (Figs. 273, 280, 281) to ovals that are longer than wide (Figs. 288, 295). In males, the flagellae on the median apophysis are set off on a distinctly narrower stalk (Figs. 271, 278, 286, 293).

35. *Metepeira petatlan* new species Figures 271–277, 334; Map 10

Holotype. Male from 50 km southeast of Petatlán, Guerrero, Mexico, 14.viii.1984, J. B. Woolley, in

MCZ. The specific name is a noun in apposition after the locality.

Description. Female paratype from Papanoa, Guerrero. Light region around posterior eye row; carapace darkens posteriorly, then lightens under overhang of abdomen (Fig. 276). Slight rings on patella and tibia. Femur I with three macrosetae on anterior side, none on anteroventral side. Dorsum of abdomen with typical folium, except that white oak leaf pattern narrower than most species and set on a narrow, remarkably darker brownish dovetail (Fig. 276). Dark lateral band wraps around abdomen and stretches up over anterior dorsal portion. Venter with two spots on either side of spiracle and slight indication of a transverse bar. Wide, white longitudinal mark ends at the epigynal groove (Fig. 277). Sternum with wide, white longitudinal mark widening anteriorly (Fig. 277). Ratio of eye diameters: posterior medians and anterior medians 1.0, anterior laterals 1.3, posterior laterals 1.2. Anterior median eyes separated by 1.1 diameters, posterior median eyes by 0.7, anterior median eyes separated from anterior laterals by 1 diameter of anterior lateral eyes, lateral eyes almost touching. Total length 5 mm. Carapace 2.2 mm long, 1.7 wide. First femur 2.3 mm, patella and tibia 2.5, metatarsus 2, tarsus 0.9. Second patella and tibia 2 mm, third 1.3, fourth 1.9.

Male holotype. Carapace uniform brown with a lighter median streak just anterior to thoracic depression (Fig. 274). Weakly ringed on tibia; distal half of femora dark. Femur I with two macrosetae on anterior side. Abdomen is a lighter version of the female (Fig. 274). Venter with a much reduced and shorter longitudinal line, compared to the female (Fig. 275). Sternum as in female. Ratio of eye diameters: posterior medians and anterior medians 1.0, anterior laterals 1.4, posterior laterals 1.4. Anterior median eyes separated by 1.1 diameters, posterior median eyes by 0.7, anterior median eyes separated from anterior laterals by 1.1 diameters of

anterior lateral eyes, lateral eyes separated by 0.2 their diameters. Total length 2 mm. Carapace 1 mm long, 0.7 wide. First femur 1.2 mm, patella and tibia 1.0, metatarsus 0.8, tarsus 0.5. Second patella and tibia 0.9 mm, third 0.5, fourth 0.8.

Diagnosis. The female's dorsum can be distinguished from other species by the unusually dark brown color of the dovetail-shaped mark (Fig. 276). Both this mark and the white oak leaf pattern have narrower margins that are more parallel and not as wedge-shaped as they are in other species (Fig. 276). The epigynum resembles that of *M. minima* by the narrow scape and the parallel slitlike openings on either side. These openings differ from those of *M. minima* because they have conspicuous sclerotized spheres just anterior to the lateral edge of the slits (Fig. 273) but which are much farther away in *M. minima* (Fig. 280). The male is unusually small and its palp is unique and easily distinguished from other species. The longer flagellum on the median apophysis is needlelike over its entire length, not gradually tapering (compare Fig. 271 with Fig. 278). In addition, the long needlelike flagellum has a sharper elbow. At the elbow it projects away from the palp for a short distance and then strongly curves around the palp (Fig. 271).

Natural History. The female paratype was found at eye level on a hot, dry, wooded hillside overlooking the Pacific Ocean at an altitude of about 200 m. Her web differed considerably from the usual *Metepeira* web: instead of an elaborate barrier web, it consisted of a much reduced Y-shaped structure with a curled leaf in the center. The leaf served as a retreat for the spider and protected and hid three egg sacs. The retreat was suspended very near the hub, as opposed to farther away and above it, as found in most other species. Mature specimens have been collected in August through October (Fig. 334).

Distribution. Western Mexico: Guerrero and Sinaloa (Map 10).

Records Examined. MEXICO Guerrero: 32 mi SE Petatlán, 17°14'N, 100°53'W, 14.viii.1984 (J. B. Woolley, MCZ); Microondas Tamarindos, S. Papanoa, 17°17'32"N, 101°2'40"W, 18.x.1994 (W. H. Piel, MCZ). Sinaloa: 2 mi S Elota, 23°55'N, 106°48'W, 11.ix.1966 (Jean & Wilton Ivie, AMNH).

36. *Metepeira minima* Gertsch
Figures 278–285, 328; Map 15

Metepeira minima Gertsch, 1936: 10, fig. 31, ♂. Male holotype from Edinburg, Texas, in the AMNH, examined. Roewer, 1942: 869. Chamberlin and Ivie, 1942: 67, fig. 174, ♀. Levi, 1977: 206, fig. 70–73, 76–77, ♀; 74–75, ♂. Bonnet, 1957: 2822. Brignoli, 1983: 275.

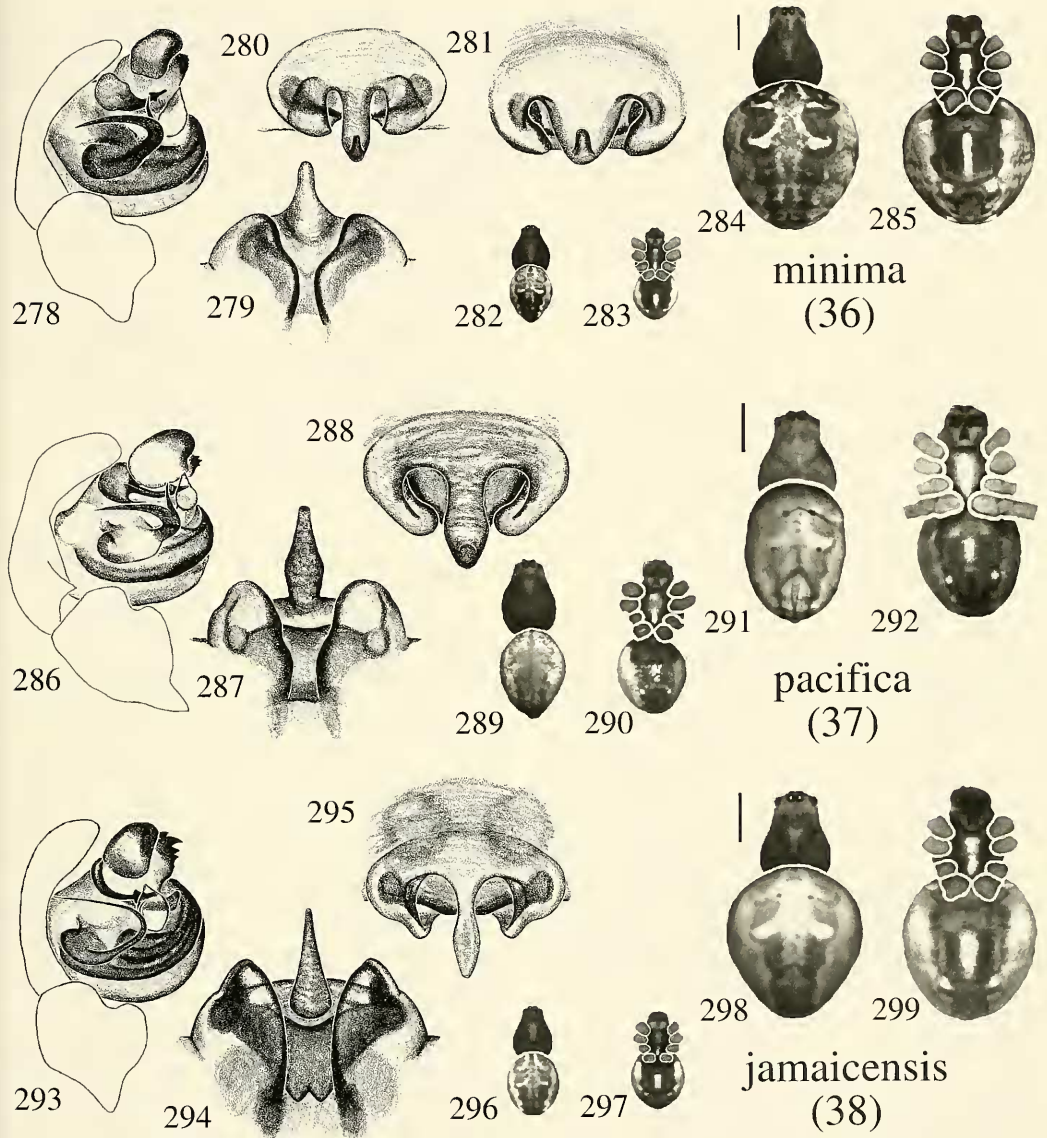
Description. Female from Celestun, Yucatan, Mexico. Carapace dark brown with light region surrounding the eyes, sometimes extending posteriorly behind the lateral eyes. Faint pair of darker feather-shaped patches in center of carapace (Fig. 284). Legs same color as carapace; darker on distal ends of articles. Femur I with row of four macrosetae on anterior side; rarely any on anteroventral side. Dorsum of abdomen with usual *Metepeira* folium (Fig. 284); venter wide, with long white median line surrounded by faint, thin, white U-shaped line (Fig. 285). Pair of large white spots on either side of spiracle. Sternum black with wide, white, uneven median line (Fig. 285). Ratio of eye diameters: posterior medians and anterior medians 1.0, anterior laterals 1.2, posterior laterals 1.1. Anterior median eyes separated by 1.2 diameters, posterior median eyes by 0.9, anterior median eyes separated from anterior laterals by 1.9 diameters of anterior lateral eyes, lateral eyes separated by 0.2 their diameters. Total length 6.5 mm. Carapace 2.7 mm long, 2 wide. First femur 2.8 mm, patella and tibia 2.8, metatarsus 2.5, tarsus 0.9. Second patella and tibia 2.4 mm, third 1.5, fourth 2.

Male from Celestun, Yucatan, Mexico. Carapace dark with light mark anterior to thoracic furrow (Fig. 282). Femur I with row of four macrosetae on anterior side; row of two to five macrosetae on anteroventral side. Distal two-thirds same color as carapace, proximal third white. Folium

of abdomen as in female, except posterior half darker than anterior half (Fig. 282). Venter of abdomen and sternum as in female, except median white line of sternum often broken (Fig. 283). Ratio of eye diameters: posterior medians and anterior medians 1.1, anterior laterals 1.4, posterior laterals 1.1. Anterior median eyes separated by 1.2 diameters, posterior median eyes by 0.8, anterior median eyes separated from anterior laterals by 1.5 diameters of anterior lateral eyes, lateral eyes separated by 0.1 their diameters. Total length 3 mm. Carapace 1.5 mm long, 1.2 wide. First femur 2 mm, patella and tibia 1.9, metatarsus 1.8, tarsus 0.8. Second patella and tibia 1.6 mm, third 0.8, fourth 1.3.

Diagnosis. Unlike other members of the *M. minima* species group, the openings to the epigynum of *M. minima* are narrow slits around a scape of variable size (Figs. 280, 281). The openings of *M. petatlan* are only slightly wider than *M. minima*, but the internal darker sclerotized spheres in *M. minima* sit much farther apart (compare Fig. 280 with 273). Unlike *M. pacifica* (Fig. 286) and *M. jamaicensis* (Fig. 293), the bent embolus on *M. minima* tapers strongly and is therefore not like a needle (Fig. 278). Unlike *M. petatlan*, the longer flagellum on *M. minima* tapers (Fig. 278) and is not thin over its entire length (Fig. 271).

Variation. Average body length of 13 females examined 5.4 mm, range 3.7 to 6.5 mm. Average body length of 17 males examined 3.4 mm, range 2.5 to 4.5 mm. The epigyna of females from the Yucatan peninsula differ noticeably from all others, but the males hardly show any distinguishing features. These differences can be seen in the much wider scape and the greater separation between openings in a specimen from the Yucatan (Fig. 281), compared to a specimen from Tamaulipas (Fig. 280) or one from Texas (Levi, 1977: 209, fig. 71). In addition, the posterior view of the epigynum from a Yucatan specimen shows the lobes converging to form a V-shape (Fig. 279), whereas females outside of the



Figures 278–285. *Metepeira minima* Gertsch (sp. 36 [278,279,281–285] 20°56'N, 90°21'W; [280] 22°30'N, 99°4'W). 278, male palpus, mesal. 279, epigynum, posterior. 280,281, epigynum, ventral. 282, male, dorsal. 283, male, ventral. 284, female, dorsal. 285, female, ventral.

Figures 286–292. *Metepeira pacifica* new species (sp. 37; 10°27'N, 85°9'W). 286, male palpus, mesal. 287, epigynum, posterior. 288, epigynum, ventral. 289, male, dorsal. 290, male, ventral. 291, female, dorsal. 292, female, ventral.

Figures 293–299. *Metepeira jamaicensis* Archer (sp. 38; 18°17'N, 76°48'W). 293, male palpus, mesal. 294, epigynum, posterior. 295, epigynum, ventral. 296, male, dorsal. 297, male, ventral. 298, female, dorsal. 299, female, ventral.

Scale bars: dorsum and venter figures 1.0 mm.

Yucatan show largely parallel lobes (Levi, 1977: 209, fig. 71).

Natural History. Adults have been observed on tree trunks and on bushes at and above 150 cm. They can be found in shaded areas, which is unusual for Mexican *Metepeira*. Most mature specimens have been collected in May through September (Fig. 328). Elevations range from sea level to just under 2,000 m.

Distribution. Southern Texas to Honduras (Map 15).

Records Examined. HONDURAS *Copán*: 14°50'N, 89°9'W, 7.iii.1939 (AMNH); Ruinas, 14°50'N, 89°9'W, 7.iii.1939 (AMNH). MEXICO *Campeche*: Becan, 18°33'N, 89°30'W, 31.vii.1991 (W. H. Piel & G. S. Bodner, MCZ); Campeche, 19°51'N, 90°32'W, 14.vii.1948 (C. J. Goodnight, AMNH); Champotón beach, 19°21'N, 90°43'W, 22.vii.1991 (W. H. Piel & G. S. Bodner, MCZ); Seybaplaya, 19°39'N, 90°40'W, 2.viii.1949 (C. J. Goodnight, AMNH). *Chiapas*: 16 mi W Cintalpa on rt 190, 16°36'N, 93°51'W, 15.vi.1982 (F. Coyle, MCZ). *Nuevo León*: 20 km E Montemorelos, Camino Q. Rayones, 25°16'N, 99°41'W, 22.vi.1981 (L. Stange, FSCA); Los Cristales, 25°33'N, 100°12'W, 15.viii.1972 (A. F. Archer, AMNH); Villa de Santiago, Hacienda Vista Hermosa, 25°25'N, 100°9'W, 19.vi.1940 (H. Hoogstraal, MCZ); San Luis Potosí: 20 km W Cd. Valles, 21°58'N, 99°11'W, 18.iii.1972 (J. A. L. Cooke, AMNH); Cd. Valles, 21°59'N, 99°1'W, 6.vii.1940 (P. Rau, MCZ), 19.vii.1956 (W. J. Gertsch & V. Roth, AMNH), 15.vii.1959 (L. Steude, AMNH); Cd. Valles, Hotel Covadonga, 21°59'N, 99°1'W (L. Steude, AMNH); Huichichuyán, 21°25'N, 98°55'W, 19.v.1952 (M. Cazier, W. Gertsch, & R. Schrammel, AMNH); Medina, 24°1'N, 100°24'W, 9.ix.1956 (A. F. Archer, AMNH); N section of San Luis Potosí, 22°13'N, 100°58'W, 8.ix.1956 (A. F. Archer, AMNH); Venado Arroyo, 22°56'N, 101°5'W [?], 27.vii.1934 (MCZ). *Sonora*: 8 mi W Alamos, 29°13'N, 110°10'W, 23.viii.1965 (W. J. Gertsch & R. Hastings, AMNH). *Tamaulipas*: 60 km N Cd. Valles, 22°30'N, 99°4'W, 10.viii.1991 (W. H. Piel & G. S. Bodner, MCZ); Cd. Victoria, 23°44'N, 99°8'W, 17.v.1952 (M. Cazier, W. Gertsch, & R. Schrammel, AMNH); Laredo road near Cd. Victoria, 23°44'N, 99°8'W, 20.viii.1947 (C. J. & M. Goodnight, AMNH); r101 26km S Tula, 22°49'N, 99°55'W, 8.ix.1991 (W. H. Piel & G. S. Bodner, MCZ); Sisal, 15 mi S Cd. Victoria, 23°38'N, 99°12'W, 22.vii.1966 (Jean & Wilton Ivie, AMNH). *Veracruz*: 15 mi E Panuco, 22°10'N, 98°3'W, 29.xi.1941 (A. M. & L. I. Davis, AMNH); Plan del Río, 19°6'N, 96°6'W [?], 26.vii.1956 (W. J. Gertsch & V. Roth, AMNH). *Yucatan*: 20 km E Valladolid, 20°41'N, 88°2'W, 26.vii.1991 (W. H. Piel & G. S.

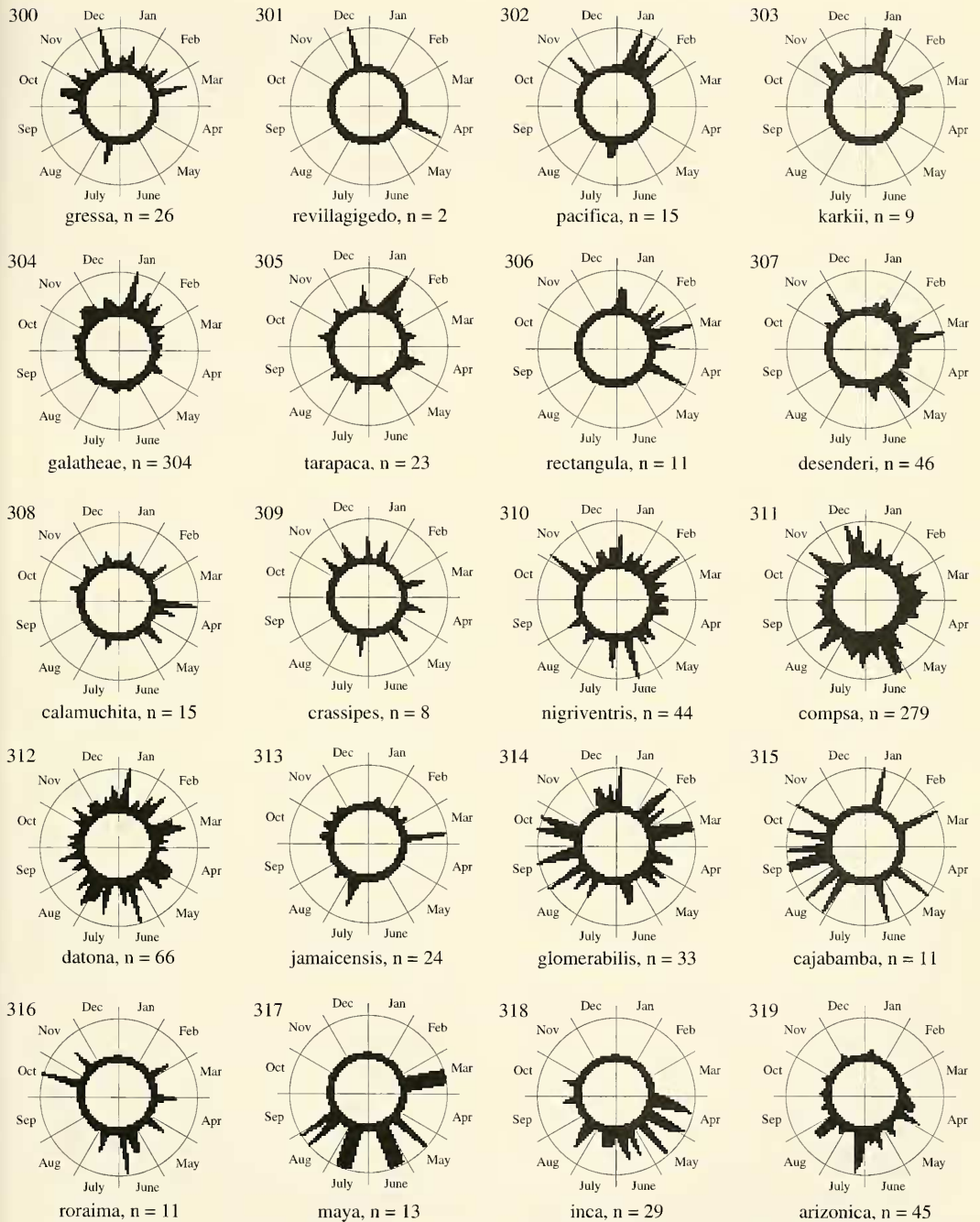
Bodner, MCZ); 3 km S San Felipe, 21°32'N, 88°14'W, 25.vii.1991 (W. H. Piel & G. S. Bodner, MCZ); 5 mi E Sisal salt flat, 21°9'N, 90°5'W, 9.i.1984 (V. & B. Roth, CAS); Balankanche Cave, 2 km E Chichen Itza, 20°40'N, 88°33'W, 19.vii.1983 (W. Madison, MCZ); beach north of Celestún, 20°56'N, 90°21'W, 24.vii.1991 (W. H. Piel & G. S. Bodner, MCZ); Chichén Itza, 20°40'N, 88°34'W (C. J. Goodnight, AMNH), 15.vii.1981 (C. Gold, CAS); Cordilleria Mayapán, 20°28'N, 89°11'W, 6.ix.1952 (J. & D. Pallister, AMNH); Uxmal, 20°22'N, 89°46'W, 7.ix.1970 (A. F. Archer, AMNH), 23.vii.1991 (W. H. Piel & G. S. Bodner, MCZ). USA *Texas*: 29 mi S Sarita, 26°47'N, 97°47'W, 14.xi.1958 (A. Brady, MCZ); 1 mi S Pharr, 26°10'N, 98°11'W, 14.xi.1958 (A. Brady, MCZ); 1 mi S Pharr on U.S. HW 281, 26°10'N, 98°11'W, 14.xi.1958 (A. Brady, MCZ).

37. *Metepeira pacifica* new species Figures 286–292, 302; Map 10

Holotype. Male from La Pacifica, Guanacaste, Costa Rica, 1.ii.1975–2.iii.1975, R. E. Coville, in MCZ. The specific name is a noun in apposition after the locality.

Description. Female paratype from La Pacifica, Guanacaste, Costa Rica. Carapace tan, lighter around eyes. Legs white. Femur I with row of three macrosetae on anterior side; none on anteroventral side. Dorsum of abdomen white with faint, indistinct folium, darker distally (Fig. 291). Gravid females often slightly marbled. Venter wide, with long white median line surrounded by faint, thin, white U-shaped line on black. Pair of large white spots on each side of spiracle (Fig. 292). Sternum black with wide, white, uneven median line (Fig. 292). Ratio of eye diameters: posterior medians and anterior medians 1.0, anterior laterals 1.2, posterior laterals 1.2. Anterior median eyes separated by 1.2 diameters, posterior median eyes by 0.9, anterior median eyes separated from anterior laterals by 1.8 diameters of anterior lateral eyes, lateral eyes separated by 0.2 their diameters. Total length 4.5 mm. Carapace 2.2 mm long, 1.7 wide. First femur 2.3 mm, patella and tibia 2.4, metatarsus 1.9, tarsus 0.8. Second patella and tibia 2 mm, third 1.2, fourth 1.8.

Male holotype. Carapace, legs, abdomen as in female, though often darker (Figs. 289, 290). Femur I with row of four



Figures 300–319. Circular histograms depicting relative seasonal abundance of collecting events for mature spiders. 300–308. Primarily collected during the northern hemisphere winter and spring seasons. 300, *Metepeira gressa*; 301, *Metepeira revillagigedo*; 302, *Metepeira pacifica*; 303, *Metepeira karkii*; 304, *Metepeira galathea*; 305, *Metepeira tarapaca*; 306, *Metepeira rectangula*; 307, *Metepeira desenderi*; 308, *Metepeira calamuchita*. 309–314. Generally collected throughout. 309, *Metepeira crassipes*; 310, *Metepeira nigriventris*; 311, *Metepeira compsa*; 312, *Metepeira datona*; 313, *Metepeira jamaicensis*; 314, *Metepeira glomerabilis*. 315–319. Primarily collected during the Northern Hemisphere summer season. 315, *Metepeira cajabamba*; 316, *Metepeira roraima*; 317, *Metepeira maya*; 318, *Metepeira inca*; 319, *Metepeira arizonica*.

macrosetae on anterior side; two to three on anteroventral side. Median white line on sternum often broken (Fig. 290). Ratio of eye diameters: posterior medians and anterior medians 1.0, anterior laterals 1.6, posterior laterals 1.6. Anterior median eyes separated by 1.1 diameters, posterior median eyes by 0.6, anterior median eyes separated from anterior laterals by 1.4 diameters of anterior lateral eyes, lateral eyes separated by 0.3 their diameters. Total length 3.4 mm. Carapace 1.7 mm long, 1.2 wide. First femur 2.2 mm, patella and tibia 2, metatarsus 1.7, tarsus 0.8. Second patella and tibia 1.6 mm, third 0.9, fourth 1.3.

Diagnosis. Unlike other members of the *M. minima* species group, *M. pacifica* and *M. jamaicensis* share very light pigmentation, and the embolus in both species is needle-shaped (Figs. 286, 289, 291, 293, 296, 298). Unlike *M. jamaicensis*, the flagellae on the median apophysis of *M. pacifica* are set off on a short, wide stalk (Fig. 286) rather than a long, thin one (Fig. 293). A ventral view of the epigynum in *M. pacifica* shows a ridge under the scape that is more V-shaped (Fig. 288), compared to a straighter line (Fig. 295).

Variation. Average body length of three females examined 5.3 mm, range 4.5 to 5.8 mm. Average body length of five males examined 3 mm, range 2.8 to 3.4 mm. Most specimens appear whitish, but the loss of pigment is variable, especially among males.

Natural History. Specimens have been collected from the wasp nests of *Trypargilum nitidum*, *T. tenocitlan*, and *T. ben-soni*. In Costa Rica, mature specimens have been collected in November through February; Honduras and Nicaragua in July (Fig. 302). Altitudes range from 100 to 2,600 m.

Distribution. Costa Rica, Honduras, and Nicaragua (Map 10).

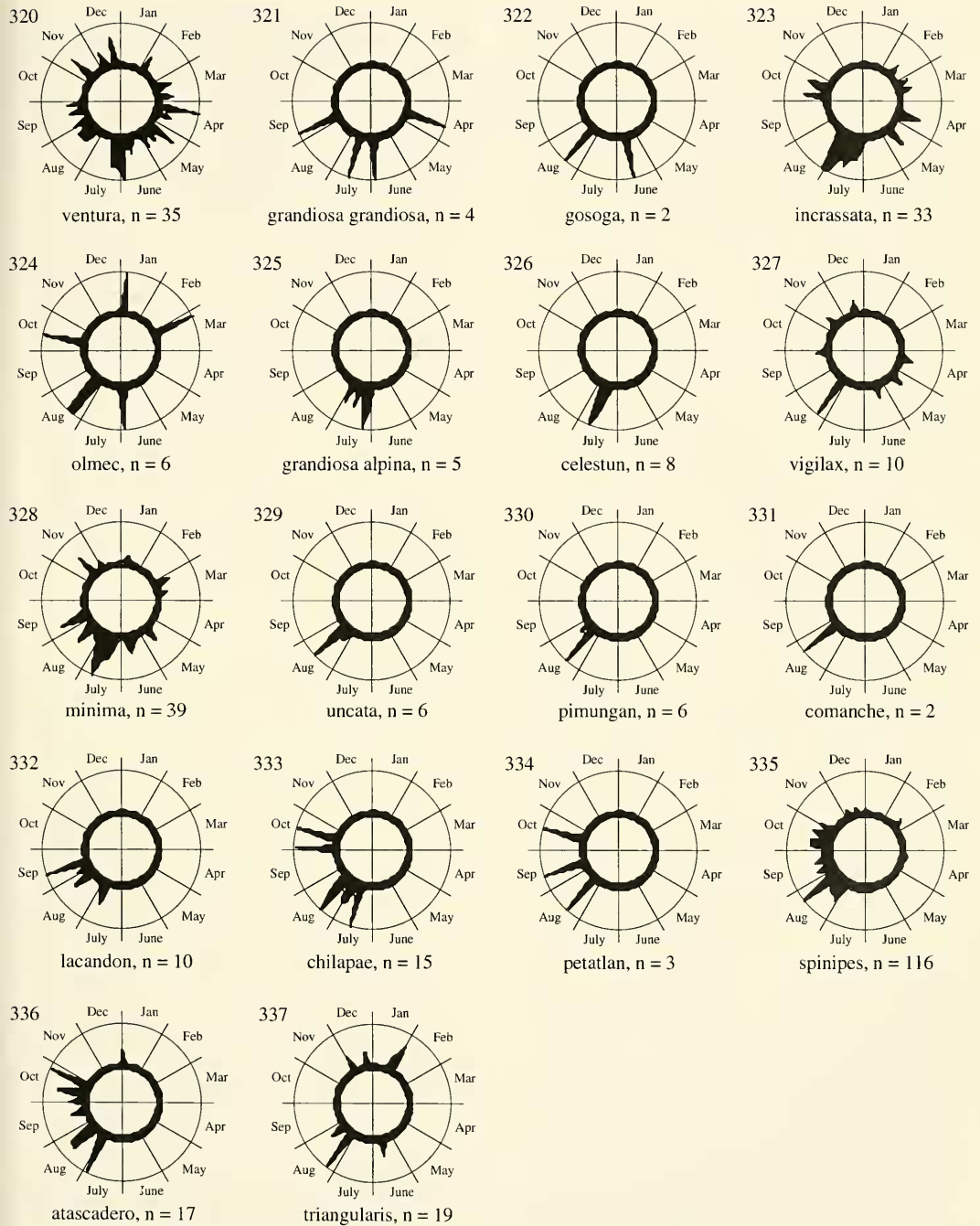
Records Examined. COSTA RICA *Guanacaste*: 4 km NW Cañas, La Pacifica, prey of *Trypargilum ben-soni*, 10°27'N, 85°9'W, 29.i.1975 (R. E. Coville, MCZ); 4 km NW Cañas, La Pacifica, prey of *Trypar-*

gilum nitidum, 10°27'N, 85°9'W, 1.ii.1975–2.iii.1975 (R. E. Coville, MCZ); 4 km NW Cañas, La Pacifica, prey of *Trypargilum tenocitlan*, 10°27'N, 85°9'W, 1.ii.1975 (R. E. Coville, MCZ); 4 km NW Cañas, La Pacifica, wasp collected, 10°27'N, 85°9'W, 16.ii.1975 (R. E. Coville, MCZ); Bagaces, Palo Verde, 10°21'N, 85°21'W, 19.i.1978 (W. Eberhard, MCZ); ca. Cañas, 10°25'N, 85°7'W, 15.xi.1982 (W. Eberhard, MCZ); Cañas, 10°25'N, 85°7'W, 15.xi.1982 (W. Eberhard, MCZ). *Puntarenas*: Finca San Miento-Sialas, 10°9'N, 84°54'W, 5.ii.1976 (Roth & Schroeffer, AMNH). San José [?]: Santa María, 9°39'N, 83°58'W, 15.i.1930 (Dodge, MCZ). HONDURAS *Tegucigalpa*: Tegucigalpa, 14°6'N, 87°13'W, 1.vii.1948 (Clarke, AMNH). NICARAGUA *Managua*: Laguna de Jiloe, SW Managua, campsite, 12°13'N, 86°19'W, 8.vii.1970 (S. Riechert, SR).

38. *Metepeira jamaicensis* Archer Figures 293–299, 313; Map 15

Metepeira jamaicensis Archer, 1958: 16, fig. 33, ♀. Female holotype from Port Henderson, St. Catherine Parish, Jamaica, in the AMNH, examined. *Metepeira minima*:—Levi, 1977: 206, 208. Brignoli, 1983: 275. Erroneous synonymy.

Description. Female from Saint Mary's Parish, Strawberry Fields near Robin's Bay and Green Castle, Jamaica. Carapace dirty brown, white around eyes, central white wedge (Fig. 298). Legs whitish yellow; slight rings on legs II and III. Femur I with row of three to four macrosetae on anterior side; none or only a few very fine setae on anteroventral side. Dorsal folium lighter than in most species; fleur-de-lis white on speckled light gray (Fig. 298). Venter brownish gray with white margins. Wide median white line with pair of large white spots on either side of spiracle (Fig. 299). Sternum brownish black with wide, white line widening anteriorly, sometimes broken in center (Fig. 299). Ratio of eye diameters: posterior medians and anterior medians 1.0, anterior laterals 1.2, posterior laterals 1.1. Anterior median eyes separated by 1.4 diameters, posterior median eyes by 0.7, anterior median eyes separated from anterior laterals by 2 diameters of anterior lateral eyes, lateral eyes separated by 0.2 their diameters. Total length 5.1 mm. Carapace 2.1 mm long, 1.5 wide. First femur 2.1 mm, patella and tibia 2.2, meta-



Figures 320–337. Circular histograms depicting relative seasonal abundance of collecting events for mature spiders. 320–331, Primarily collected during the northern hemisphere summer season. 320, *Metepeira ventura*; 321, *Metepeira grandiosa grandiosa*; 322, *Metepeira gosoga*; 323, *Metepeira ventura*; 324, *Metepeira olmec*; 325, *Metepeira grandiosa alpina*; 326, *Metepeira celestun*; 327, *Metepeira vigilax*; 328, *Metepeira minima*; 329, *Metepeira uncata*; 330, *Metepeira pimungan*; 331, *Metepeira comanche*. 332–337, Primarily collected during the northern hemisphere fall season. 332, *Metepeira lacandon*; 333, *Metepeira chilapae*; 334, *Metepeira petatlan*; 335, *Metepeira spinipes*; 336, *Metepeira atascadero*; 337, *Metepeira triangularis*.

tarsus 1.8, tarsus 0.8. Second patella and tibia 1.9 mm, third 1.2, fourth 1.7.

Male from same locality as female. Male carapace, dorsum, venter, sternum darker and more contrasty version of female (Figs. 296, 297). All legs ringed. Femur I with row of three macrosetae on anterior side; none on anteroventral side. Ratio of eye diameters: posterior medians and anterior medians 0.9, anterior laterals 1.2, posterior laterals 1.2. Anterior median eyes separated by 1.3 diameters, posterior median eyes by 0.9, anterior median eyes separated from anterior laterals by 1.2 diameters of anterior lateral eyes, lateral eyes separated by 2.3 their diameters. Total length 2.3 mm. Carapace 1.2 mm long, 0.9 wide. First femur 1.4 mm, patella and tibia 1.3, metatarsus 1.0, tarsus 0.5. Second patella and tibia 1.2 mm, third 0.6, fourth 0.9.

Diagnosis. Unlike other members of the *M. minima* species group, *M. jamaicensis* and *M. pacifica* share very light pigmentation and the embolus in both species is needle-shaped (Figs. 286, 289, 291, 293, 296, 298). Unlike *M. pacifica*, the flagellae on the median apophysis of *M. jamaicensis* are set off on a long, thin stalk (Fig. 293) rather than a short, wide one (Fig. 286). A ventral view of the epigynum in *M. jamaicensis* shows a ridge under the scape that almost forms a straight line (Fig. 295), compared to a V-shape (Fig. 288).

Variation. Average body length of eleven females examined 5 mm, range 4.2 to 6.1 mm. Average body length of four males examined 2.4 mm, range 2.3 to 2.6 mm.

Natural History. Mature specimens have been collected in July through March (Fig. 313).

Distribution. Primarily in Jamaica and Haiti (Map 15), near sea level.

Records Examined. BRITISH WEST INDIES *Grand Cayman Island*: 19°20'N, 81°10'W, 15.ii.1960 (R. A. Lewin, MCZ). HAITI *Département de L'Ouest*: Port-au-Prince, 18°32'N, 72°20'W, 19.vii.1955 (A. F. Archer, AMNH), 20.vii.1955 (A. F. Archer, AMNH). *Dept. de L'Artibonite*: Saint-Marc,

19°7'N, 72°42'W, 15.i.1913 (W. M. Mann, MCZ). JAMAICA *Cornwall*: Montego Bay, 18°28'N, 77°55'W, 1.iii.1984 (L. E. Schulten Jr, MCZ). *Middlesex*: 3 mi E Old Harbor, 17°56'N, 77°10'W, 21.x.1957 (A. M. Chickering, MCZ); Christiana, 18°10'N, 77°29'W, 13.xi.1957 (A. M. Chickering, MCZ), 15.vii.1960 (C. & P. Vaurie, AMNH), 17.vii.1960 (C. & P. Vaurie, AMNH); Strawberry Fields near Robin's Bay and Green Castle, 18°17'N, 76°48'W, 23.iii.1972 (H. W., L. & F. Levi, MCZ), 25.iii.1972 (H. W., L. & F. Levi, MCZ), 26.iii.1972 (H. W., L. & F. Levi, MCZ). *Saint Ann*: Roaring River, 18°24'N, 77°9'W [?], 8.ii.1946 (B. Heineman, AMNH); Saint Ann's Bay, 18°26'N, 77°8'W, 20.xi.1959 (A. M. Nadler, AMNH). *Saint Catherine*: E Green Harbour, S slope of Healthshire, 17°53'N, 76°51'W, 12.viii.1958 (A. F. Archer, AMNH). *St. Andrews*: Ferry, 9/10 mi on Spanishtown Road, 18°2'N, 76°53'W, 26.vii.1955 (A. F. Archer, AMNH). *Survey*: Kingston, Mona Road, pasture, 17°59'N, 76°24'W, 10.x.1957 (A. M. Chickering, MCZ); Roselle Falls, 24 mi E Kingston, 17°59'N, 76°24'W, 29.x.1957 (A. M. Chickering, MCZ); Saint Andrew, 18°4'N, 76°45'W, 7.x.1957 (A. M. Chickering, MCZ). *Trelawny*: Falmouth, 18°30'N, 77°39'W, 20.vii.1960 (C. & P. Vaurie, AMNH). *Westmorland*: Negril, 18°16'N, 78°21'W, 24.iii.1955 (A. M. Nadler, AMNH); Whitehouse, 18°4'N, 77°58'W, 26.iii.1955 (A. M. Nadler, AMNH).

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